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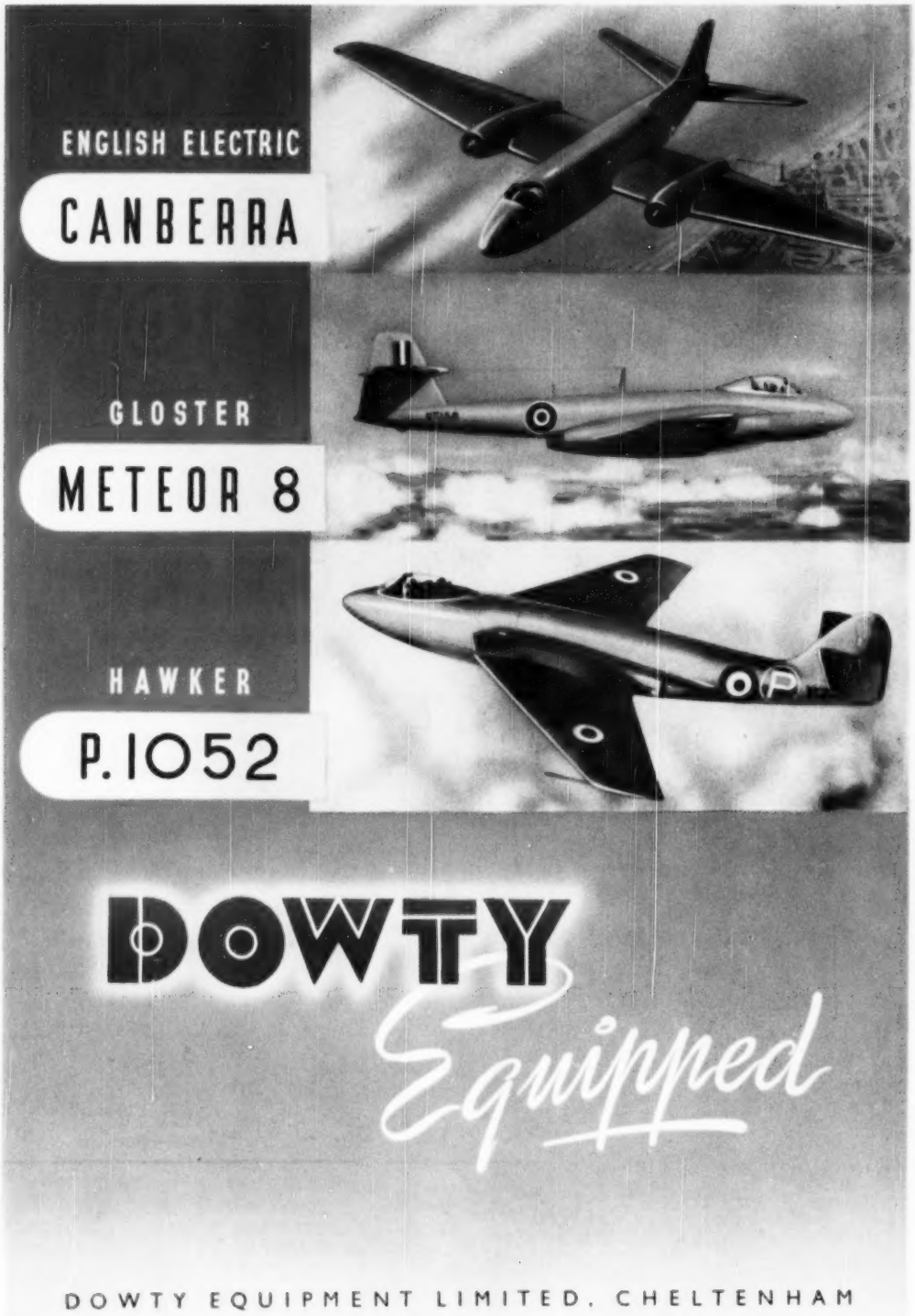
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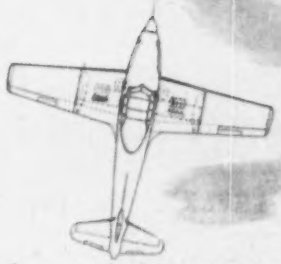

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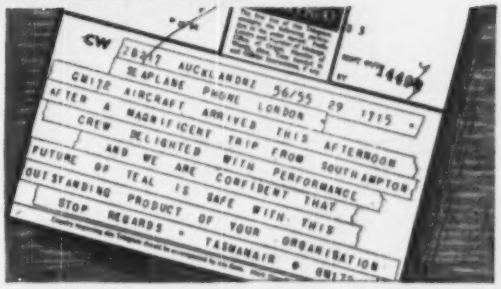
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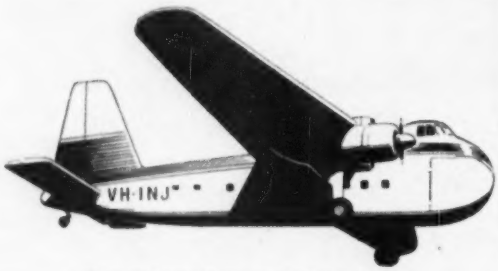

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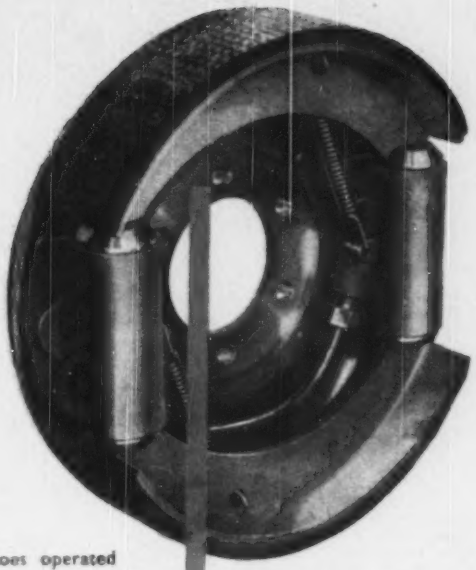

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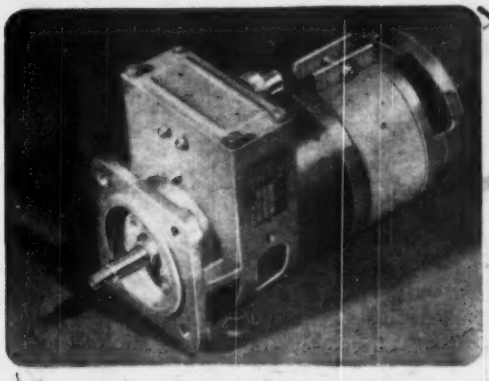

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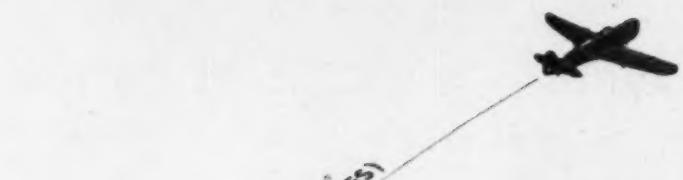

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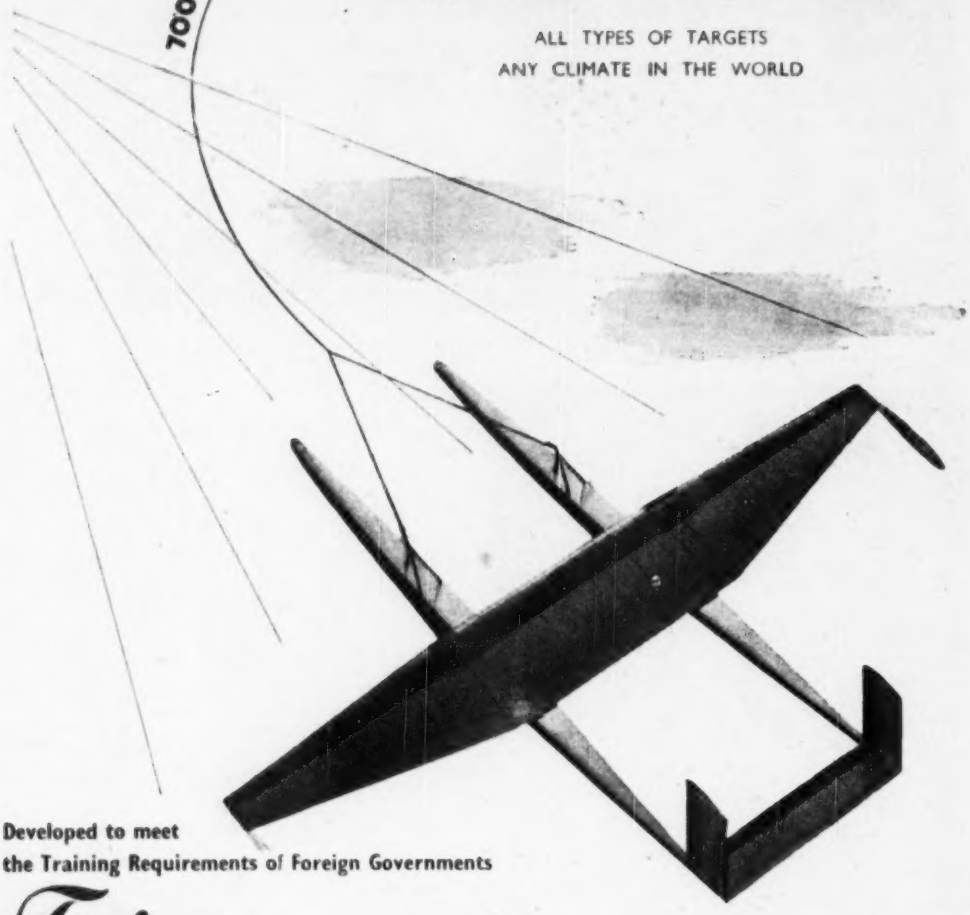

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First Aeronautical Weekly in the World

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No. 2154 Vol. LVII. THURSDAY, 6 APRIL 1950

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Telegrams : Flightpress, Sedist, London.
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The Industry's Way Ahead

SINCE reference was made here some weeks ago, under the heading "Perilous Policy," to the lack of orders for aircraft and the consequent run-down and risk of unemployment in the industry, a little more has been learned of intentions regarding re-equipment of the R.A.F. as revealed by the financial estimates for the year 1950-51. Broadly speaking, the vote for aircraft and stores will be larger by £13½ million than it was last year. This is Mr. Arthur Henderson's figure, given in the House of Commons on March 21st. Previously, Mr. Shinwell, in his statement on defence, had stated that more than £20 million extra would be spent on the Air Force and upon research and development, the greater part of which would be for the Air Force. The Civil Estimates appear less favourable, the figure for this year being only £2,400,000 as compared with £4,636,500 for last year. It is believed that this reduction may be due mainly to the fact that the development costs for the Brabazon and Princess boats, and also costs in connection with the Comets, have already been provided for in earlier estimates. From these and other figures, and from its own knowledge of current orders and export prospects, the aircraft industry thus receives some guidance in making its plans.

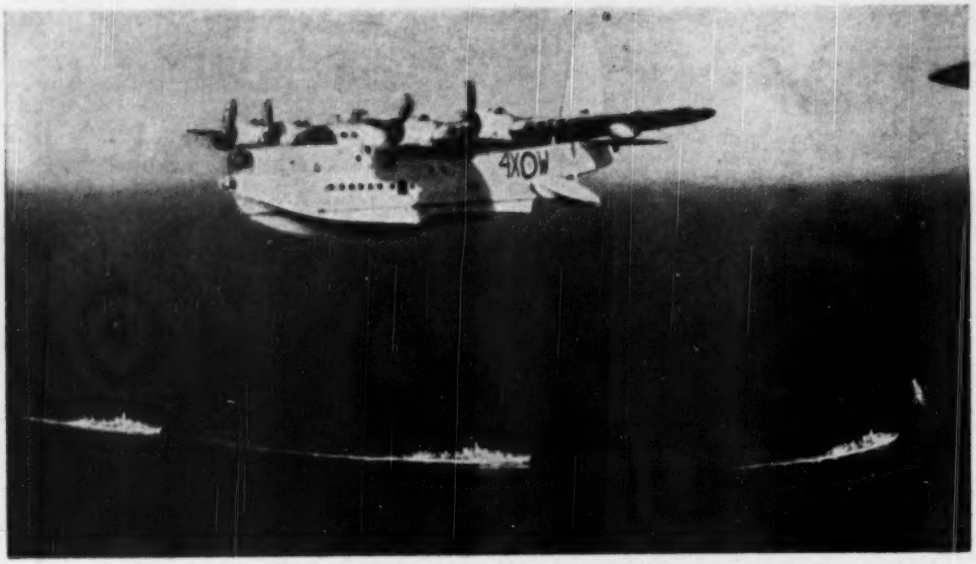
While it is essential in the national interest to maintain the aircraft industry in an active and healthy state, it would be unrealistic for all the individual manufacturers to depend too much upon orders which may or may not be forthcoming from the Ministry of Supply. It is now generally accepted, especially in the case of large aircraft, that the building and development of a new military or civil prototype is such a prolonged and costly business that no single company could undertake it without some aid or guarantee. But the acceptance of this view is a very different thing from a belief in complete dependence upon the State for orders. The old proverb about help for those who help themselves is worth consideration in this highly specialized and competitive industry, for wartime practices and conditions —and subsequent policies and politics—have had the tendency to dull the keen edge of enterprise and even the clear foresight for which this country has been noted in past years.

Never before, perhaps, have the companies within the industry been more dependent for their future prosperity upon those charged with their direction; and, conversely, never has a greater responsibility been placed in the hands of those who, in the absence of Government contracts, must decide how best to use the talents of their respective staffs and the works facilities at their disposal. It is the opinion of many that the companies which are now in the strongest position are also those which have shown the greatest enterprise.

We can foresee, in the coming years, a challenging period in which competition will increase, in which new weapons may augment and even slowly replace several classes of military aircraft, and in which production will be dispersed to the Dominions and elsewhere for reasons of security and the desire of these younger countries to build up a self-contained industry of their own. Canada, in particular, with the aid of English parent-companies, is actively working towards a self-contained aircraft industry.

In America, current talk of meeting the challenge thrown out by British gas-turbine airliners, in particular the Comet, may in the coming year be turned into rapid action, for already the first stage towards providing a £4 million subsidy to American manufacturers towards the development of jet airliners is under discussion.

Wise individual planning now, together with increasing efficiency, can, we have no doubt, ensure a prosperous future for the bulk of the companies comprising the British aircraft and ancillary industries. This must be reflected in the prosperity of the country as a whole. It may be recalled that last year aviation exports brought in £34,215,177, and there is every reason to believe that this sum will be exceeded in the coming year. Moreover, half the sum should not again be offset by a regrettably large figure—£17,362,000—for aircraft imports.



During the combined Home and Mediterranean Fleet Exercises, held recently, Coastal Command Sunderlands—one of which is seen on patrol above—were temporarily based on Gibraltar. On return to Pembroke Dock, they continued to operate with the Home Fleet. A first-hand account of one of the Sunderland sorties appears on the following page.

NAVAL EXERCISES

R.A.F. Takes Both Sides in Latest Home Fleet Manœuvres

UNDER the command of Admiral Sir Philip L. Vian, K.C.B., K.B.E., D.S.O., the Home Fleet last week concluded one of the most intensive series of air-sea exercises held since the war. Late in January, the Fleet set out for the Western Mediterranean, where it operated in conjunction with units of the Mediterranean Fleet and the French Navy. By the beginning of last week, the Home Fleet was approaching the Bay of Biscay on its return voyage, and the Commander-in-Chief, Portsmouth, Admiral Sir Rhoderick McGrigor, K.C.B., K.B.E., D.S.O., assumed supreme command of "Redland"—the exercise title applied to South-Western England.

The main opposing force of "Blueland"—a nation presumed to exist in place of Spain and Portugal—was, of course, the Home Fleet, temporarily named "Task Force 51," and composed of the battleship *Vanguard* and an unspecified number of carriers and escort vessels.

As the first phase of the week's warfare resolved itself, the main conflict was seen to be between Task Force 51 and the Schnorkel-equipped Redland submarines submerged ahead of it. Blueland was therefore provided with the somewhat unrealistic assistance of Redland-based anti-submarine aircraft, namely, Coastal Command Sunderlands and Lancasters, from Pembroke Dock and St. Eval. During the exercise's second phase, the Lancasters changed sides, taking over responsibility for shadowing the Task Force on behalf of further Redland forces. Led by the carrier *Illustrious*, the

The cruiser *Cleopatra* puts up a lethal-looking defence—skilfully "aimed short"—against a Sea Fury's diving attack.

latter included a cruiser, several destroyers and other light escort vessels, M.T.B.s and—in the air—Bomber Command Lincolns from Upwood and a Naval Aviation strike and fighter force from Culdrose. The Sunderlands maintained their anti-submarine role throughout both phases of the exercise.

By comparison with previous air-sea manœuvres, little information was forthcoming concerning progress of the "battle"; an Admiralty ruling precluded detailed reports on either composition or movements of the forces engaged, in order to increase the realism of the exercise. *Flight* therefore welcomed the opportunity, afforded by the Air Ministry, of taking at least a glimpse of the theatre of operations—through the porthole of a patrolling Sunderland. A member of the staff flew with Coastal Command on March 29th on an anti-submarine sortie from Pembroke Dock.

The fact that our Sunderland flew for 13 hours (he writes) without contacting the "enemy," despite vigilant watch-keeping, both visually and by radar, heightens one's respect for the long-range crews of Coastal Command. Their work demands protracted perseverance and concentration, and only rarely is rewarded by the excitement of sudden action.

Our Sunderland 5 was captained by F/O. Witter, with F/L. Ramsden, A.F.C.—a recent "convert" from Transport Command Dakotas—as co-pilot. Navigator was F/L. Mockford, and running of the four Pratt and Whitney Twin Wasps was superintended by M. Eng. Corp and Eng. IV Lakin; Sig. I Charles, Sig. I Bate and Sig. II Clarke made up the complement of eight. In addition, we carried Midshipmen Baker and Chavasse, temporarily attached from the cruiser *Ceylon*. Following briefing and an early lunch, we took off at 1336 hr on Wednesday. During the initial climb, however, our No. 3 (starboard inner) engine developed a fairly severe oil leak and had to be feathered forthwith. Before returning to base, it was regrettably necessary to jettison some 800 gallons of fuel, to decrease our alighting weight. Back at Pembroke, we transferred rapidly to a second Sunderland and by 1410 hr were again in the air.

Stores aboard the aircraft included eight 8½-lb practice bombs, to be dropped on submarines submerged to the tip of their "Schnorkels," flares, markers and sono-buoys. The latter carry small V.H.F. transmitters and are dropped in patterns to pinpoint the underwater position of a suspected submarine. Alternatively, they may be deposited in lines around a convoy to give warning of submarine activity within a varying radius, according to the prevailing condition of the sea's surface.

During the first hour or so, as the Sunderland kept up a steady 130kt towards the patrol area, sunlight fell brightly through large gaps in the low strato-cumulus layer, so that we enjoyed an excellent view of the Atlantic 5,000ft below. Then the cloud thickened, and, descending to about 1,200ft, we found visibility further decreased by haze. Occasionally a small steamer came in view, but it was impossible to ascertain the source of every blip on the A.S.V. radar screen without extreme deviation from course. By this time, the drab scene below was of a barren, colourless, almost motionless expanse, broken only by slowly spreading foam-patches—surely the most immediate recollection of every wartime member of Coastal squadrons operating in the Bay of Biscay. "How we ever managed to find anything without radar is beyond me now," said one of the crew.

At 1650 hr we reached our allotted position ahead of Task Force 51. In the absence of fresh orders from the Blueland Commander, our duty was to make a "creeping line-ahead" search for submarine or other activity in the path of the oncoming fleet. Our course for the next six hours therefore consisted of a series of parallel movements, spaced according to visibility, across the probable future track of the Task Force. As our patrol area lay in a major shipping lane, radar contacts were frequent, but proved to be strictly non-belligerent in origin. During the inevitably monotonous patrol period, one appreciated in full the Sunderland's sizable interior, for there was room in which to enjoy a very warm welcome and well-cooked supper, produced from the galley by one of the signallers.

The end of an uneventful search came at 2305 hr. Making needless apology for the lack of activity, the captain expressed hope that submarines had at least been persuaded to "keep their heads down." Such is often the vital but unspectacular function of Coastal Command's search squadrons.

Almost exactly 13 hours after departure, at 0305 hr on Thursday morning, the Sunderland touched down on the Pembroke Dock flare-path. We followed a launch in to dispersal, where our crew set about refuelling in readiness for the next sortie—scheduled for mid-afternoon of the same day.

HAS THE INTERCEPTER HAD ITS DAY?

By W/C. E. COTON, D.F.C., A.F.C., A.F.R.Ae.S.

IN 1939, it was widely forecast that the bomber would get the better of the fighter, yet, in the event, the fighter achieved a fair degree of mastery. It might seem rash to make the same prophecy again, namely that the fighter will become useless, but there is a very solid reason for thinking that this will indeed be the case. No practicable form of fighter can possibly cope with the jet bomber. If any last-war experience can be used to predict the outcome of the contest between the jet bomber and its contemporary fighter opponent, it is the success of the Mosquito night bomber against the Luftwaffe night fighters. In many ways, the jet bomber is better placed than the Mosquito was, even if day jet-bomber operations are compared with the night Mosquito operations.

The factor which is likely to defeat the fighter is new in aerial combat—it is the handling ceiling. It exists because, at the heights at which jet aircraft can be expected to operate, stalling speeds are so close to the speed of sound that the amount of *g* which can be applied is limited by shock stalling. Were it not for this effect, *g* could be applied up to the point where the normal stall occurred. When this *g* limit is only just high enough to avoid gust stalling, and to allow the minimum of essential manœuvres, the aircraft is at its handling ceiling. As in all stalling matters, the wing loading has the biggest influence on the handling ceiling; and, to raise this ceiling by roughly fifteen thousand, it is necessary to halve the wing loading. The same must be done, if, say, 4*g* manœuvres are required at the operational height instead of 2*g* manœuvres.

It is a characteristic of jet aircraft that maximum still-air range, and maximum working ceiling, require the same ratio of engine size to wing area. From the maximum-ceiling point of view, the handling and performance ceilings have to be made equal by suitable choice of the ratio. Any departure from the optimum ratio means that the handling ceiling is, say, raised by reducing engine weight, and the performance ceiling is consequently lowered, or vice versa. The normal variations of weight due to consumption of fuel, and so on, affect the two ceilings equally.

It is fair, then, to assume that well-designed bombers will attack at their handling ceilings, and the problem for the fighter designer is to get his handling ceiling high enough for the fighter to approach and attack them. The demand for *g* is going to be about double that of the bomber, implying that the wing loading must be no more than half. There is a handicap to start with, because the fighter has to be stronger and is (one hopes) smaller. Consequently, empty, it is heavier. Nothing can be gained by adding wing area, since this would upset the optimum wing area to engine ratio. The awkward fact is that the empty bomber already has the minimum attainable wing

(*Continued on page 446*)

VAMPIRE AND METEOR CONTRACTS

Variants Adopted by British and Foreign Services

One of a batch of Gloster Meteor 4 intercepters (two Rolls-Royce Derwent 5 turbojets) supplied to the Danish Government. The camouflage is distinctive.

ONE of the most heartening features of British air news in recent times has been the steady flow of overseas orders for de Havilland Vampire and Gloster Meteor jet fighters, fighter-bombers and trainers. Licences for the construction of both types have also been granted on an important scale. For the convenience of readers these contracts and licences are now summarized, though in most instances, at the customer's request, the quantities involved, and deliveries made to date, are not divulged.

Great Britain.—The Royal Air Force is using the Vampire Mks. F.1, F.3 and F.B.5, all with Goblin 2 turbojet, and Vampire 1s form the equipment of certain R.Aux.A.F. units. Naval Aviation has taken delivery of a quantity of Sea Vampire F.20s (Goblin 2). Of the Meteor marks in British service, the F.4 (two Derwent 5) forms the principal equipment of Fighter Command daylight intercepter squadrons; the dual-control T.7, with the same power plant, has been delivered in substantial numbers for training. Meteor F.3s (two Derwent 1), together with a small number of F.4s, are in service with the Royal Auxiliary Air Force.

Canada.—Eighty-five Vampire F.3s (Goblin 2) have been supplied.

Australia.—The de Havilland Aircraft (Pty.), Ltd., at Bankstown, Sydney, is manufacturing an unspecified number of Mk. 30 Vampires (Rolls-Royce Nene).

South Africa.—A quantity of Vampire F.B.5s (Goblin 2) has been supplied to the South African Air Force.

India.—The Indian Government has contracted for an unstated number of Vampires, principally of the F.B.52 type, with Goblin 3.

Egypt.—The Egyptian Government has ordered Meteor F.4s and T.7s and Vampire F.B.5s and F.B.52s.

France.—Delivery has been made of an unspecified number of Vampires—principally Mk F.B.5s (Goblin 2)—and licences have been granted to build the Vampire airframe. French-built Vampires will be powered with the Rolls-Royce Nene.

Italy.—Vampires of several marks are being supplied, and licences have been granted for the manufacture of "de Havilland fighter aircraft and engines."

Sweden.—Substantial numbers of Vampires have been supplied; these are Mk 1s (Goblin 2) and Mk 50s (Swedish-built Goblin 3).

Norway.—An unrevealed quantity of Vampires—mainly Mks. 3 and 52—has been ordered.

Switzerland.—Four Vampire F.1 (Goblin 2) and seventy-five F.B.6 (Goblin 3) have been procured and a licence has been taken to build the Vampire airframe.

Belgium.—Meteor F.4 fighters and T.7 trainers are being delivered.

Denmark.—This country, likewise, has adopted Meteor 4s and 7s.

Holland.—Meteor F.4s and T.7s have already been supplied, and Fokker have the newer F.8 in production.

Argentina.—A large quantity of Meteor F.4s has been delivered.

Venezuela.—This country has ordered an unspecified number of Vampire 5s (Goblin 3).

The de Havilland Aircraft Co., Ltd., state that they are not authorized to comment on the considerable overseas interest in the D.H.113 night fighter, although it may be said that the type is on order for two air forces.

In some quarters opposition has been expressed to the whole policy of selling modern British military aircraft to foreign Powers outside the Western Union. When (as reported in *Flight* of March 23rd) Mr. Churchill raised this particular point in the Defence Estimates debate, Mr. Attlee said that, though we could not afford to buy for ourselves all the jet aircraft that the industry produced, it was desirable to keep to a war policy of manufacture in case of need for rapid expansion. Sales of aircraft abroad did not mean any weakening of our Air Force. The sale of jets to Argentina [specifically cited by Mr. Churchill] could be justified, for there was the need for both war potential and exports.

Our own view is that R.A.F. and R.Aux.A.F. squadrons should have the latest fighters available. At present they have not.

POST-WAR ROUMANIAN

THE first aircraft to be built in Roumania since the war has been completed at the Sovromtractor works at Brasov. This company was formerly known as Regia Autonoma Industria Aeronautica Romana, and before the war it was controlled by the Roumanian Ministry of Air and Marine. It was responsible for several original designs, including the I.A.R. 80 and 81 radial-engined single-seat fighters, and the I.A.R. 37, 38 and 39 three-seat reconnaissance/bomber biplanes. After the Balkan *coup* in 1941, interest in the firm was taken over by the Hermann Göring Werke and the Messerschmitt A.G., and production was centred on the Me 109F, certain Italian designs, and parts for the Me 110 and 210. Following the armistice with Roumania, the Soviet-Roumanian commercial agreement provided for the conversion of the undertaking for tractor production, which is now in full swing.

Technicians of the tractor works have nevertheless managed to fit in the design and construction of a two-seat experimental touring aircraft, designated I.A.R. 811. Difficulty was encountered in construction, where all facilities were devoted to the production of 2,000 tractors per year. All work was carried on in the experimental section, whilst wind-tunnel tests were accomplished with the co-operation of the Bucharest Polytechnic University.

The I.A.R. 811 is a neat low-wing monoplane of mixed construction, powered by a 60 h.p. Train air-cooled in-line engine. The first flights were made in May, 1949, and since then the machine has logged a number of hours, during which it is said to have proved very manœuvrable, with good general flying characteristics. It may be adopted as an aerobatic trainer, and plans are under consideration for building a small series with Czech Walter Mikron engines. Data (with a fixed-pitch wooden airscrew) are: Span, 34ft 11in; empty weight, 926 lb; gross weight, 1,434 lb; wing loading, 8.4 lb/sq ft; cruising speed, 84 m.p.h.; landing speed, 40 m.p.h.; climb to 3,280ft, 8 min.

HERE and THERE

U.S. Civil-Jet Subsidy?

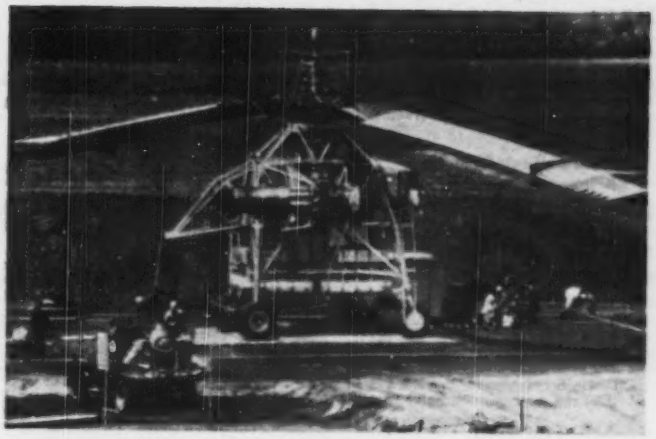
IT is reported that the U.S. Budget Bureau has set aside £4 million as a subsidy—yet to be approved by Congress—towards development of gas-turbine airliners as an answer to the Comet. In some quarters there has been opposition to such help: it is regarded as the thin end of a nationalization wedge.

Finned Freighter

A MILITARY version of the Bristol Type 170 Freighter, shown to members of the Western Union Air Advisory Committee some weeks ago, is fitted with a dorsal fin.

Glider Endurance Record

AN attempt on the world's two-seater glider endurance record (standing at 50 hr 26 min to the credit of a German crew in 1938) was to have been made recently by Mr. John Free and another member of the Cambridge University Gliding Club. The weather, however, has been so consistently unsuitable that the attempt has now been postponed until the Club holds its summer camp in June. The sailplane to be used is a Kranich, and it will be equipped with a Marconi walkie-talkie set.



FLYING BEDSTEAD: Secured from a hillside with the aid of a 40-inch telephoto lens, this picture reveals the Hughes XH 17 weight-lifting, turbine-powered helicopter being prepared for static tests. By comparison, the Cierva resembles a steeplechaser.

A King's Cup Reminder

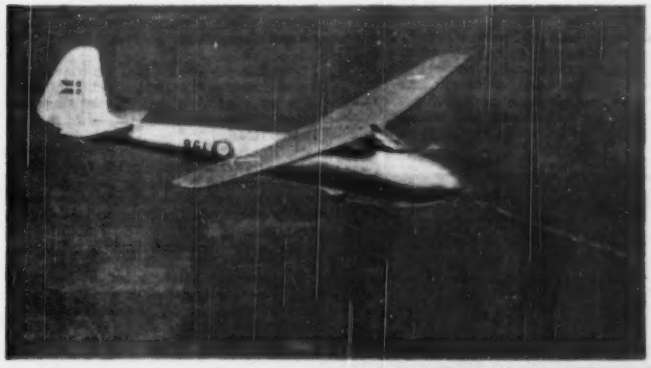
ENTRIES for the King's Cup Race, which is to take place at Wolverhampton on June 17th, close in less than a fortnight—namely, on April 19th. Closing date for entries for the Goodyear Trophy Race, to be held at the same airfield the following day (June 18th) is also April 19th. The award of the King's Cup (for which only British pilots are eligible to compete) carries with it a cash prize of £150.

Tightening the Bond

LIVE attacks on ground targets were demonstrated at Old Sarum last week during a four-day conference, on close support land forces, which was attended by some 100 senior Air Force and Army officers of the five Western Union powers. Running commentaries in French and English accompanied each demonstration.

R.P.s for Bomber Defence

AS intimated by Stanley H. Evans in "American Notebook" (*Flight*, March 23rd, 1950), research is being conducted by the U.S.A.F. into the possibility of using rocket projectiles as the defensive armament of bombers. *Aviation Week* now reports that a Convair B-36, with six turret-housed, twin rocket-launchers (one turret forward,

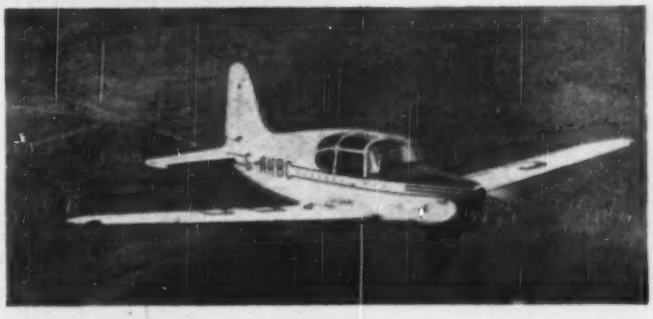


TOW-LINE EXPORT: One of the Eon Olympia sailplanes being towed by the prototype Newbury Eon (below) from the makers' works to Lympne preparatory to the start of one of the export flights to Denmark (see accompanying paragraph). Marking, so to speak, the other end of the scale, the sailplane makes an interesting contrast to the "Danish" Meteor illustrated on p. 424.

"Flight" photograph.

Delivering the Goods

AS foreshadowed recently in *Flight*, Elliotts of Newbury, Ltd., have adopted a novel method of exporting some of their Eon Olympia sailplanes. Three, destined for the Royal Danish Air Force training station at Karup, in Jutland, are being towed out this week in a series of ferry flights *via* Ostend, Ypenburg and Hamburg. Mr. W. L. Jennings is flying each sailplane, with Mr. Lostak piloting the tug—the prototype Newbury Eon. Last Friday, also, the Belgian Verviers Flying Club took aero-tow delivery of another Olympia, presented to them by the town of Spa.



HERE AND THERE . . .

two upper, two lateral and one tail) will be tested this summer. Mention is made of the Hughes MX-904 projectile, with an estimated weight of 75 lb, including a 10-lb warhead, and a Mach Number of 2.5.

Latécoère Boat Lost

TEN lives were lost when, on March 28th, a Latécoère 631 six-engined flying-boat crashed in the sea off Cap Ferrat while on a test-flight from the S.N.C.A.S.O. works at Bordeaux.

Hercules in France

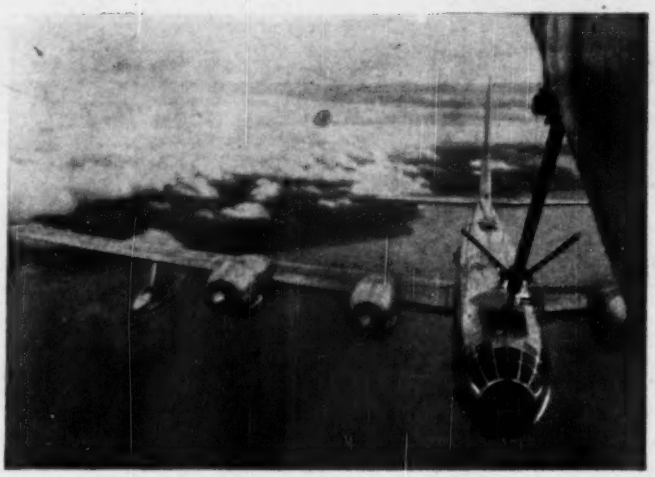
TWO Bristol Hercules 739 engines are installed in the second prototype of the Nord 2500 freighter, now nearly complete. The first example had S.N.E.C.M.A. 14Rs. Being of high-wing, twin-boom layout, the Nord 2500 resembles the American Fairchild Packet.

Mitchell Trainers?

PROPOSALS have been submitted to the U.S.A.F. by North American Aviation for converting surplus B-25 Mitchell bombers for use as crew trainers. The estimated cost of modification is less than $100,000 per aircraft, whereas the new, and much larger, Convair crew trainer, as already ordered, costs more than five times this amount.

Invisible Light

INFRA-RED AERIAL PHOTOGRAPHY, by Mr. G. C. Brock of the R.A.E., Farnborough, will be one of the papers read at a conference on photography and cinematography by invisible radiation, to be held (10 a.m.-9.30 p.m.) at London University Institute of Education, Malet Street, W.C.1, on April 15th. Among the films shown will be part of *P.P.I. Radar*. The conference is organized jointly by the Royal Photographic Society and the Scientific Film Association and tickets (members 15s, others £1) are obtainable on early application to the latter body, at 4, Great Russell Street, London, W.C.1.



TRUNK LINE: A Boeing B-50D, seen from the B-29 tanker from which it is receiving sustenance for its four Wasp Majors through the Boeing-developed telescopic, controllable, refuelling boom. The boom is "steered," with the aid of aerofoil surfaces, by an operator ("Clancey") in the tail position of the B-29.

Helioplane Production

DURING 1950, the Helio Aircraft Corporation plans to produce a total of 100 Helioplane Four "safety-first" light aircraft. The prototype Helioplane, a two-seater, formed the subject of a preliminary description in *Flight* of October 20th. Actual production will be undertaken by Aeronca.

Among the features exhibited by the prototype were full-span flaps, automatic leading-edge slats, castering undercarriage and a particularly "effective engine-silencing system. Although its general performance is competitive with other American light aircraft, the Helioplane showed unusual slow-flight qualities: 100-ft take-offs and landings and level-flight speeds as low as 30 m.p.h.

BRISTOL IN HERTFORDSHIRE: A 1/2,500 model, of Bristol and environs, in process of being built by Hunting Aerosurveys, Ltd., at Elstree. Huntings also made the photographic air survey from which the detail is reconstructed. A special article explaining modern air-survey techniques will appear in *Flight* next week.

NEWS IN BRIEF

THE index to Vol. LVI (July-December, 1949) of *Flight* is now available, and may be obtained, price 1s (by post 1s 1½d) from Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Binding cases (5s 6d by post, including index) are also available.

* * *

Queries have arisen as to the type-number of the Bristol helicopter, a reference to which appeared last week. The correct designation is 173.

* * *

Portable pneumatic and electric sheet-metal-shearing machines are the subject of a new leaflet issued by the Consolidated Pneumatic Tool Co., Ltd., 232, Dawes Road, London, S.W.6.

* * *

Sir Frederick Handley Page has been elected chairman of the council and executive committee of the City and Guilds of London Institute, following the retirement of Prof. R. S. Hutton and Brigadier H. Clementi Smith.

* * *

Emphasizing the affinity between dinghy-sailing and flying, a sailing club has been formed on Belfast Lough by members of the firm of Short Bros. and Harland, Ltd. The managing director, Rear Admiral Slattery, is commodore.

* * *

A well-produced manual recently issued by the Dunlop Rubber Co., Ltd., contains a survey of the more general types of flexible pipes and flameproof hose developed by the company. Comprehensive data on servicing and installation is also included.

* * *

The Anglo-American Oil Co., Ltd., announces the appointment of Mr. T. G. G. Thorpe as industrial lubricants co-ordinator, industrial sales department. He was previously manager of the technical sales department in which post he is succeeded by Mr. Kenneth C. Hunt, who joined the Company in 1937 as an aviation specialist in the technical department.

AIRWORK *Charter Division..*

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The Contract Charter Division is yet another important section of the world-wide organisation of Airwork Limited. With its home base at Blackbushe Airport, Surrey, Airwork employs 48 aircraft; 66 seasoned pilots; 30 other crew as well as a team of efficient air hostesses. Backed by the organisation's own Repair and Maintenance sections—an advantage few firms can claim—it is able to provide all-in, self-contained service unrivalled for smoothness and dependability of operation. Outcome of eighteen years' planned development, Airwork Charter Division forges yet another link in a progressively developed chain of closely inter-related services designed to appeal especially to all interested in long-term charter work.

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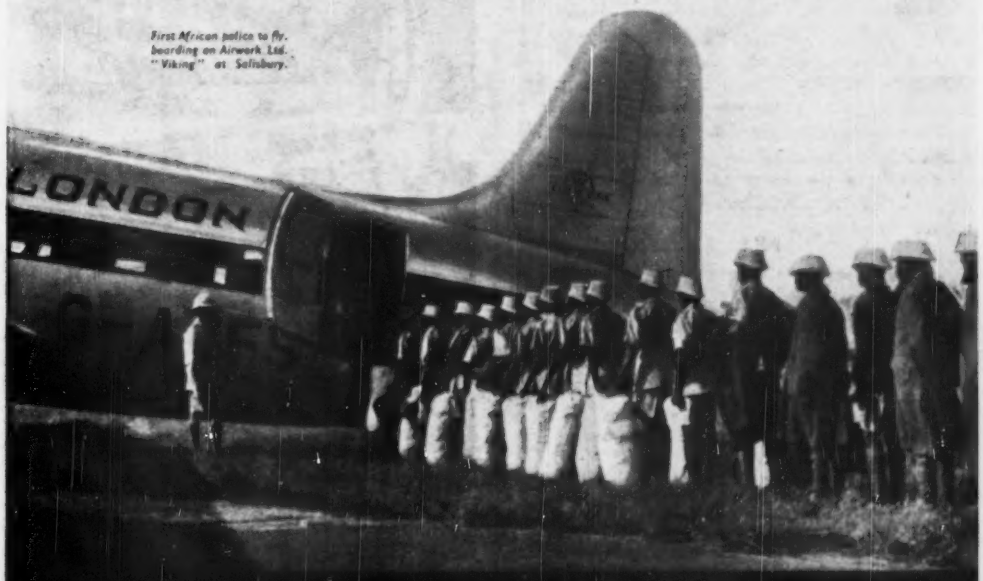

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GAS-TURBINE TESTING

A Dissertation on the Extent and Practice of Power-unit Development

A NOTABLE contribution was made to a wider knowledge of the intricacies of gas-turbine testing when Mr. A. C. Lovesey, O.B.E., B.Sc., F.R.Ae.S., Chief Development Engineer, Rolls-Royce, Ltd., presented his paper, *Modern Methods of Testing Aero-engines and Power-plants*, to the Royal Aeronautical Society last Thursday, March 30th. A digest of the lecture, with a selection from the numerous illustrations, appears below.

The lecturer introduced his paper with the observation that the gas turbine, as opposed to the piston engine, was readily dissectable into all its main components and much of the rapid development could be attributed to this factor. The turbojet, after the early struggles of Whittle, came into the picture as a delightfully simple engine. It had its problems, but, to those who graduated through the piston engine era, those problems, although large, seemed fewer. In striving for improved performance, the simplicity was, nevertheless, rapidly being designed out of the engine and this called for better and more specialized test equipment. For this reason, Mr. Lovesey's paper dealt exclusively with the gas-turbine aircraft power-unit.

The time from the start of design of a new engine until the start of production was usually anything from three to four and a half years, and the engine bench-testing might be between 3,000 and 5,000 hours with even more time devoted to rig-testing of the main components. In addition, there might be another 1,000 to 1,500 hours' flight-testing.

Apart from the supply of engines, the biggest item of development both in time and money was endurance testing. For example, a power unit of 7,000-lb thrust, when run on the standard M.o.S. 150-hour test, would use between 80,000 and 100,000 gallons of fuel, whereas a piston engine in the 2,000 h.p. class would use about 22,000 gallons of fuel. These two examples were not directly comparable, but did show the order of increase in expenditure entailed.

The average cost of testing components on the rig, i.e., compressor, turbine and combustion, was approximately

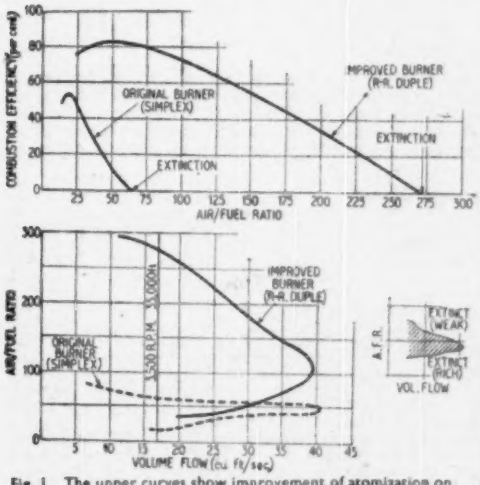


Fig. 1. The upper curves show improvement of atomization on combustion efficiency whilst the lower curves illustrate improvement in stability range obtained through better atomization.

B 13

Mr. Lovesey has been concerned with Rolls-Royce research and experimental work since 1923.

half that of full-scale engine testing and, therefore, the aim should be to include as much of the development work as possible in the first two classes of testing. The better equipment now available and the ingenious use of better instrumentation should contribute to an economy in the third form of testing, i.e., endurance. What was probably more important, it should tend to speed up development.

The design of the testing programme was no less important than the design of the engine itself, and time devoted to careful thought in this direction was well repaid. The design of special equipment or instrumentation should run parallel with the main design so that the special test apparatus was available for the first engine run. Examples of this were such items as pressure and temperature tappings, and devices for measuring movements or loads all within the engine interior.

Combustion Considerations

Usually, a new design of combustion chamber started life on a rig where air at the required pressure, temperature and quantity, together with the requisite quantities of fuel, were supplied under simulated engine operating conditions. It was, however, not infrequently found that a combustion chamber which gave excellent results on the rig left a lot to be desired on the engine. Combustion testing should really start with an examination of the airflow from the compressor outlet to make sure that this was in a satisfactory condition to be accepted by the combustion chamber.

A simple apparatus for this purpose consisted of a number of pitot tubes which could fully traverse the outlet duct of the combustion chamber annulus. By this means, a complete picture of the velocities at the head of the flame tube and in the air annulus could be obtained.

An extension of this method was also used for determining the airflow conditions within the flame tube, but these tests were run under cold conditions. They did, nevertheless, show clearly that the aerodynamics of the combustion chamber should be developed to a satisfactory state before any actual burning tests were made.

Mr. Lovesey observed that the fuel burner was one of the major factors controlling stability at high altitudes and a high degree of atomization should be aimed at over a wide flow range. For investigations of this sort, high-speed photography was a considerable aid and, in this connection, the Mullard Flash Tube, which gave a flash of one million candlepower for a millionth of a second, was a very useful tool. As a result of thorough photographic investigation of burner performance, an improvement in spray characteristics had been achieved (Fig. 1).

It was necessary to ensure that the temperature pattern at the turbine blades was the best possible to avoid heat failures, and it was usually preferable to have higher temperatures at the tip and lower temperatures at the root where, of course, the blade stress was highest. An apparatus for investigating temperature pattern consisted of nine doubly shielded thermo-couples, each of which could radially traverse the combustion chamber discharge nozzle. One method of presenting the results was by means of a celluloid model in which the ordinates represented the temperature (Fig. 2). Actual blade temperature could be determined by the Brinell hardness recovery method. In

GAS-TURBINE TESTING . . .

this case, it was necessary to fit a turbine with a few specially tempered blades and to run a steady test of approximately half an hour's duration. The calculated stress along the length of the blade could be plotted and, in addition (through the creep properties of the blade material), the stress to cause creep failure in 100 hours could be plotted for the temperature of the blade at the different stations. The distance between these two curves represented the margin of safety (Fig. 3).

Turbine blade tip clearances were bound to vary over the different operating conditions of the engine and it was, therefore, desirable to have complete knowledge of these

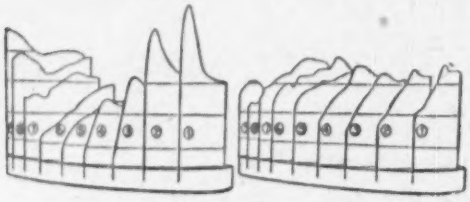


Fig. 2. Celluloid models of temperature patterns, that on the right showing improvement effected by flame-tube modification

variations. Two methods had been successfully employed, (a) the visual method and (b) the floating-pin method.

The visual method entailed cutting slots or windows in a suitable position in the shroud ring so that a shadowgraph of the blade tip in relation to the shroud ring and/or nozzle guide vanes could be obtained. A powerful light was shone through the quartz windows and the beam reflected from a mirror into a remote telescope in the test cell. A suitable scale could be fitted in the eyepiece of the telescope and a shadow of the blade in relation to the shroud could thus be observed while the engine was running. With the magnification in the telescope it was possible to read changes of clearance to the order of 0.002in (Fig. 4).

The floating-pin method consisted of a probe operated by an electric motor. An electrical contact was arranged which reversed the travel of the probe upon the lightest touch of the blade the travel away from the moving blade again being reversed at any convenient pre-determined distance. The pin, however, floated in a position at which it just contacted the blade and, therefore, the clearance could be determined at any instant. The apparatus was very suitable for measuring blade tip clearances in axial compressors (Fig. 5).

In reference to strain-gauge tests of turbine blades, Mr. Lovesey stated that wire-wound strain-gauges were used on rotating gas-turbine impellers by Rolls-Royce in 1943.

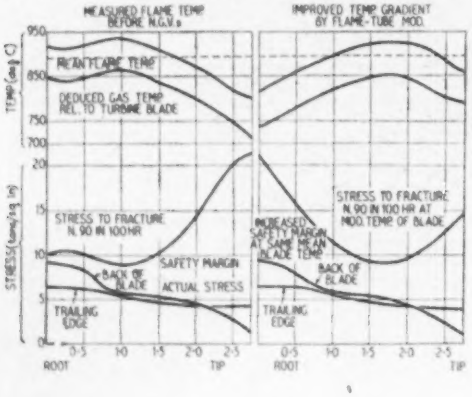


Fig. 3 (left). Curves of blade life, showing improvement resulting from flame-tube modifications.

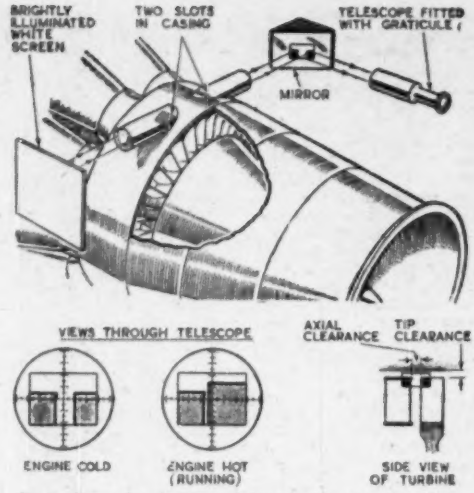


Fig. 4. Set-up for shadowgraph examination of turbine-blade clearance, showing region scanned and typical views obtained.

Since that time, considerable progress had been made and the silver-graphite brushes used in the original experiments had now been entirely superseded by mercury slip-rings.

Recently, however, strain-gauges had been applied to the much more difficult problem of investigating the frequency, mode and amplitude vibration of turbine blades in running engines. This development had involved two main problems; first, it had been necessary to find an adhesive which, having the necessary electrical insulating properties at high temperatures, would also adhere to the blade with sufficient tenacity not only to resist the centrifugal force equivalent to 10,000 *g*, but also to ensure that the wire of the gauge was stretched and shrunk by the blade during vibration. In Fig. 6 is shown a turbine blade prepared for the strain-gauge, a strain-gauge fitted, and a typical example of the results obtained by means of the method.

The second main problem was that the sensitivity of a gauge fitted to a turbine blade was low, and it was necessary to employ slip-rings, the resistivity of which was extremely constant, since any change in voltage drop at the slip-rings was amplified in the ancillary equipment and made it impossible to get a clear indication of strain changes in the blade.

Photo-elastic stress analysis of highly stressed parts was used almost daily and its contribution to reliability was not to be overlooked. Two examples were cited by the lecturer, the first showing how modification to the nut of a bearing-cap reduced the stress concentration in the thread

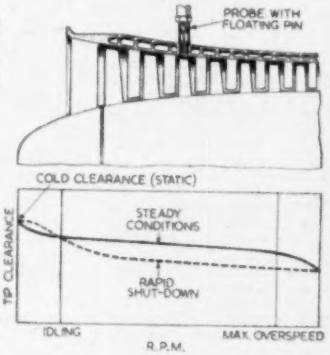


Fig. 5 (right). Arrangement of floating pin for blade tip-clearance measurement and typical curves of clearance variation against speed range.

fillet of the stud and eliminated fatigue failure; the second example showed an improvement in the fir-tree root fixing of a turbine blade (Figs. 7 and 8).

The wind tunnel had several applications in the development of aircraft power units, one of its uses being in the investigation of air intakes. In this instance, the tunnel was used for sucking through a full-scale mock-up of the duct; by this means, the flow conditions at the entry of the compressor, together with the pressure losses, could be carefully studied.

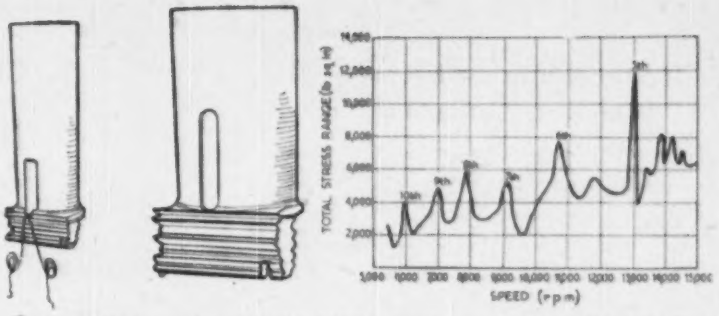


Fig. 6. Machined recess in turbine blade (*right*), and strain-gauge fitted in position (left). The curve is for a typical hot strain-gauge test on a blade; numbers indicate vibration orders.

A simple form of wind tunnel for this purpose consisted of a Derwent turbojet inside a duct in the tunnel, the total airflow through the working section of the tunnel being made up by air drawn in by the unit itself, plus the additional airflow induced by the injector effect from the Derwent's efflux. A piece of equipment of this kind was relatively cheap and possessed great flexibility. The apparatus could be used for quarter-scale models of various intake wing configurations, or full-scale intake duct tests. In the Rolls-Royce tunnel, a Mach number of 0.78 could be reached in the working section, which had an area of 707 sq in, and a maximum airflow of 200 lb/sec could be obtained.

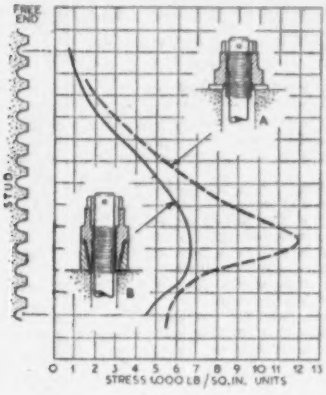
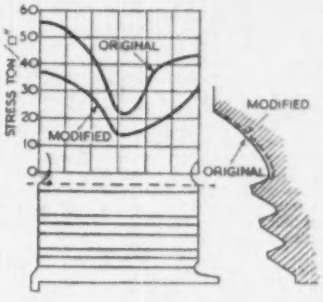


Fig. 7 (left). Reduction in stud stress concentration by re-design of nut.
Fig. 8 (below). Reduction in stress of turbine blade-root fixing.



In conclusion, Mr. Lovesey remarked that the development period was often from two to three (or more) times as long as was taken to design the basic unit. It had sometimes been said that, if the design were sound, it would not be necessary to do so much development. This, of course, was a mistake. The design of a new project was based on all the knowledge available at the time, and the testing period was a manifestation of the gaps in that knowledge. If an engine was to show sufficient technical advantage over its predecessors, there were bound to be problems. They did not arise, however, until the material had taken shape, and it was by means of testing that they were uncovered and that the engineer could come to grips with them.

THE DISCUSSION

At the conclusion of the lecture A. Cdre. F. R. Banks (Associated Ethyl Co., Ltd.) opened the discussion by complimenting Mr. Lovesey on his paper and went on to enquire whether it was possible to test very large compressors (*circa* 18,000 h.p.) by throttling them and driving them at about one-third the horse-power.

Dr. Moult (de Havilland) referred to the difficulties with the Duple burner at the change-over from pilot jet to main jet and, after suggesting that the recessing of a turbine blade for strain-gauge insertion would affect the vibratory characteristics, said he would like to know what sort of statistical accuracy was obtained from Rolls-Royce strain-gauge measurement. He also enquired how many channels it was found possible to provide with mercury troughs.

Mr. O. Lawrence (Lucas), in referring to the inequalities of flow into combustion chambers, stated that it was interesting that early combustion chambers were made from stainless steel, but it was found that mild-steel chambers had better vibration damping characteristics. He was surprised at Mr. Lovesey's comment that it took longer to do tests on an altitude plant than to do flight tests.

Mr. Jakobsson (*Flygmotor*, Sweden) referred to the effect of interaction between the external airflow around the tailpipe and the jet exhaust. With a sharply tapering nacelle, the external flow could, he thought, constrict the effective jet diameter and, although this would result in a higher effective thrust, it also might incur higher turbine temperatures, which were dangerous for the blades.

Mr. A. W. Morley (College of Aeronautics) enquired what the difference was between gross thrust and net thrust as estimated from flight work. It seemed to him that there was no difference between the true altitude test of an engine and the flight test.

Mr. J. L. Edwards (de Havilland) enquired whether Rolls-Royce had investigated the effects of skin cooling as a means of mitigating flame-tube buckling and whether, in Mr. Lovesey's opinion, orthodox combustion chambers suffered through having excessive rigidity. He referred to the incompatibility of burner spray cone angle and penetration energy of the fuel. In regard to the true measurement of total temperatures under very low pressure conditions at altitude, this was a relatively easy job on such aircraft as Meteors, where fairly long tailpipes were used, but Mr. Lovesey's opinion would be welcomed on this matter in the case of, say, the Vampire, where the lack of a tailpipe gave no straightening section.

Mr. S. Scott-Hall (D.T.D. (A), M.O.S.) enquired whether Mr. Lovesey had any figures of the possible reduction in time and cost of testing as a result of the better vibration characteristics of the gas turbine relative to the piston engine. He also said he would like Mr. Lovesey's opinion as to the suitability of the current type-test conditions.

Mr. Hancock (M.O.S.) stated that it was often said that an engine was not used in a civil aircraft until it became obsolete and he would like Mr. Lovesey's opinion as to the desirability of developing a new engine and a new aircraft in parallel.

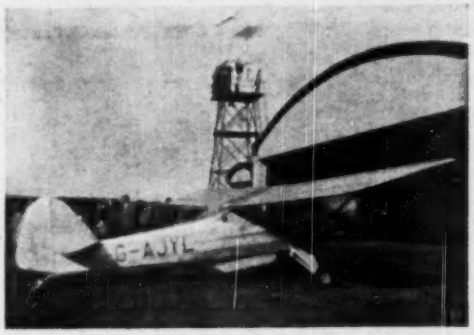
FAREWELL to RATCLIFFE

Leicestershire Aero Club Holds a "House-cooling" Display and Dance

TO mark their departure from Ratcliffe Airfield to another location—probably to be Rearsby—the Leicestershire Aero Club held a final flying display on March 25th. The weather, unlike that of the rest of the week, could not have been better, there being about three-eighths cloud at 4,000ft, and by about 3 p.m. all thirty of the visiting aircraft had arrived. The flying displays, which were all, with one exception, aerobatic, were of the highest order. The first contribution was by a V.R. Tiger Moth in the hands of F/L. A. Bullman, who did, among other things, some of the finest slow rolls seen for a long time. Next man off was Ranald Porteous, for crazy flying in an Autocrat fitted with the Goodyear cross-wind landing gear, which in the course of the demonstration was shown off to very good effect.

The third item, an aerobatics-cum-crop-dusting display, was given by Mr. Leatham with an appropriately equipped Autocrat; many people commented on the large amount of dusting powder that the Auster managed to carry—a supply which seemed to be almost inexhaustible. Next came the demonstration of the Auster Autocar given by Porteous, who proceeded to make it do almost everything that the Moth had done, and just as well! The final show was also given by Porteous, but this time on his Miles M.18, which seemed to have the performance and handling qualities of a fighter.

At 4.30 p.m. all visiting pilots were called together for briefing for the grand finale, which was to be a mass formation flight of all available aircraft over Leicester. At 4.45 the sixteen aircraft taking part commenced to take off, and they returned by way of Rearsby some 30 minutes later. The day was rounded-off by a dance in the club-house, very well attended by about 300 members and their friends.



The crop-dusting Auster which impressed the crowd. Ratcliffe's familiar spider-leg control tower is visible in the background.

A HUNDRED YEARS of METEOROLOGY

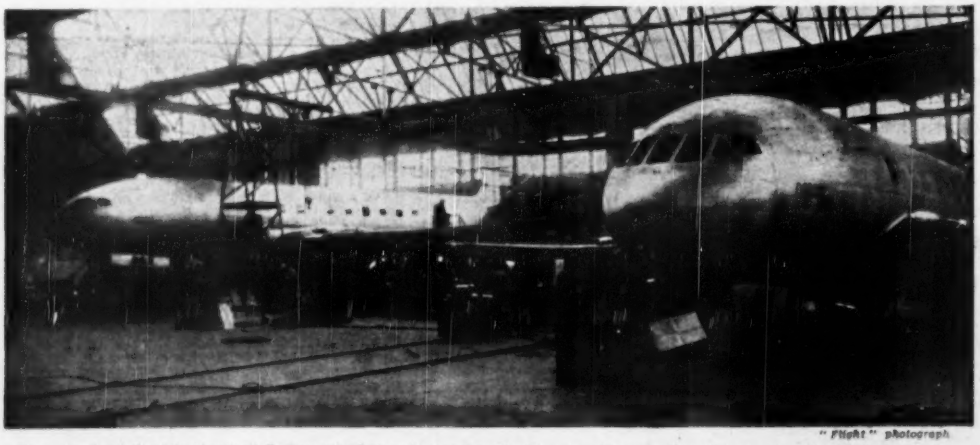
IN the Centenary Number of *Weather* (published by the Royal Meteorological Society), Sir Nelson Johnson, K.C.B., D.Sc., Director of the Meteorological Office, draws attention to some milestones in a century of meteorology (the Society's centenary fell due on April 3rd). The long-standing international aspect of the science is illustrated by the fact that as early as 1853 Lt. Maury, U.S.N., called an international conference in Brussels to lay the foundations for the international ship-reported weather observations. At about this time, gale warnings by electric telegraph were instituted for the west coasts of Europe. One of the leading sponsors of this latter innovation was Admiral Fitzroy, who invented the term "forecast" and, by trying to foretell the weather, took the first plunge into the sea of comment which has surrounded weather forecasts ever since.

The value of ballooning as a means of obtaining upper-air observations was quickly realized by meteorologists when the sport was in vogue in mid-Victorian times, and Glaisher, Superintendent of Greenwich Observatory, is reputed to have reached a height of 11 km.

Meteorological knowledge advanced considerably as the years passed, and the existence of the stratosphere was discovered at the turn of the century and explained ten years later. It was not until about 1920, however, that Bjerknes produced his frontal theory on which modern forecasting is based. The first radio-sonde reading was successfully obtained in 1927, and the measurement of winds above cloud layers was proved possible by radar methods in 1937.

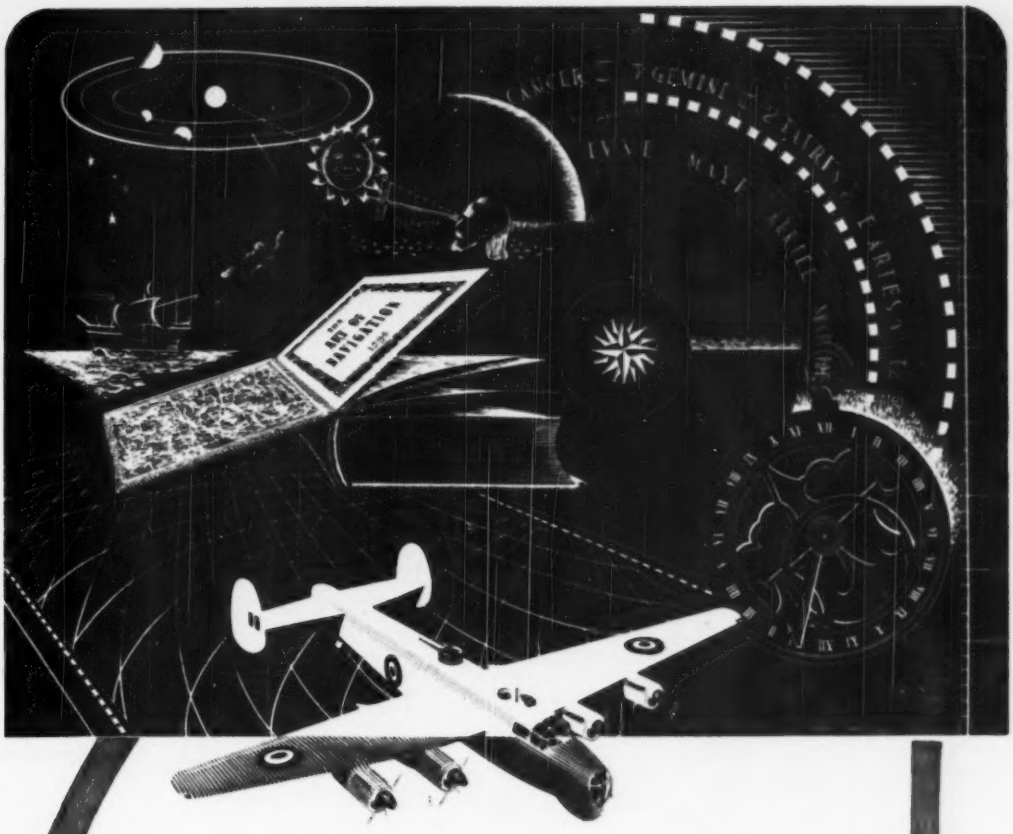
Sir Nelson indicates that with an increase in upper-air observations, and computing machines to interpret them, weather forecasting in the future may show a great change in technique.

COMETS in PRODUCTION—an ENCOURAGING PICTURE from HATFIELD



"Flight" photograph

The second and third de Havilland Comets (the first and second production aircraft) are well on the way towards completion in the assembly shop at Hatfield. No. 06002 (the second for the M.o.S.), seen here in the background, is the further advanced of the two and is expected to fly in the late summer or early autumn of this year. Fuselages of several others are taking shape.



Navigation—old and new

It is far from the days when the early navigators attempted to determine their position by cross staff, astrolabe and zodiac circle. It is more than 200 years since chronometer and octant first guided the ships of the world. Now, with modern navigational aids the Avro Shackleton, patrolling far from friendly shores, can carry out devastating attacks on objectives located with uncanny accuracy.

AVRO *Shackleton*

FOR LONG-RANGE MARITIME RECONNAISSANCE

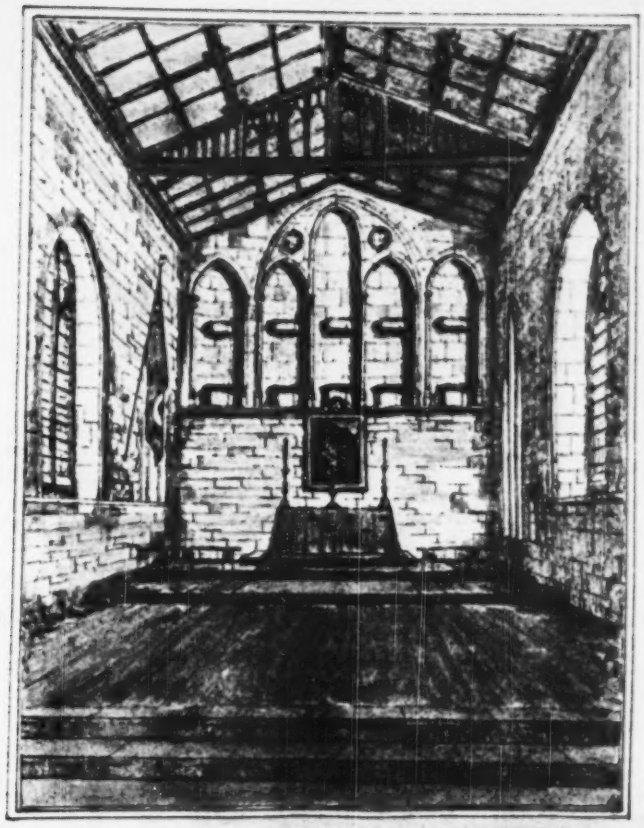
A. V. ROE & CO. LTD. MANCHESTER

MEMBER OF THE HAWKER SIDDELEY GROUP

New blades of high-lift section characterise the de Havilland propellers now under development for many turbine installations, including the Handley Page Hermes 5

DE HAVILLAND PROPELLERS

DE HAVILLAND PROPELLERS LIMITED, HATFIELD, ENGLAND


PRIORY CHURCH OF S. BARTHOLOMEW THE GREAT.
The Lady Chapel as a setting for 600 City of London Squadron Memorial.
Drawing No: 7
Seals and Regd. Architects 41 Cloth Fair E.C.1. March 1950.
Drawn by

A drawing by Lord Mottistone of the interior of the church of St. Bartholomew the Great, showing the R.A.F. ensign and—visible immediately below it—the commemorative tablet to No. 600 Squadron R.Aux.A.F. below. The altar cloth is to be embroidered with wings.

CITY OF LONDON SQUADRON MEMORIAL

On the Occasion of the Squadron's Jubilee Her Majesty the Queen is to Unveil a Commemorative Tablet in One of the City's Most Ancient Churches

THE memorial service for members of No. 600 (City of London) Squadron, R.Aux.A.F., which is to be held in the priory church of St. Bartholomew the Great on July 26th, will also mark the silver jubilee of the unit. During the ceremony Her Majesty the Queen, who is Honorary Air Commodore of the squadron, will unveil a memorial stone to those who have died in the squadron in the 25 years of its existence. The stone is being designed by Lord Mottistone, F.R.I.B.A., who is the Honorary Architect of St. Bartholomew's and also a member of the City of London T.A.F.A.

At the same service, an R.A.F. ensign, presented by Mr. Norman Searle, A.R.I.B.A., will be dedicated by the Bishop of London and laid up in the church. Officiating at the service, in addition to the Bishop of London, will be Dr. N. E. Wallbank, rector of St. Bartholomew the Great; A.V-M. the Reverend L. Wright, Chaplain-in-Chief of the R.A.F.; and the Reverend H. R. V. Foster, vicar of Bethnal Green and lately chaplain of No. 600 Squadron. A guard of honour drawn from all ranks will be mounted at the west entrance.

Among those who have already indicated their intention to be present are Sir Frederick Rowland, the Lord Mayor of London; Air Chief Marshal Sir John Slessor, Chief of Air Staff; Air Marshal Sir Basil Embry, A.O.C. in C., Fighter Command; A.V-M. T. G. Pike, A.O.C. No. 11 Group, and Lord Huntingfield, who is the Honorary Air Commodore of No. 21 (City of Melbourne) Squadron, which is affiliated to No. 600.

St. Bartholomew the Great is one of London's oldest churches. Seals are in existence dated as early as A.D. 1137. The fabric was rebuilt in the year 1410, and the present church is what was once the choir of the old priory building.

Accommodation at the ceremony will be strictly limited, and anyone wishing to attend must obtain tickets beforehand from the squadron's headquarters, Finsbury Barracks, City Road, E.C.1.

FIREFLY in the Air

Handling Fairey's Versatile Naval Two-Seater : Variety of Armament

No. 37 OF THE SERIES

By THE EDITOR

CERTAIN aircraft have assured themselves of immortality by their long service and versatility, particularly in times of war. The Camel, Spitfire and Mosquito may be cited as classic examples. Others earn themselves a lasting place in history, even though they see little or no action. The Hart and its variants here come to mind. To-day there are a few current designs which will be remembered, and one of them is undoubtedly the Fairey Firefly, which over a period of years has demonstrated its versatility, chiefly for naval work, and has succeeded as well in making an international appeal. On later pages will be found pictorial indication of the exceptional variety of military loads which the Firefly can carry.

Recently, I was given the opportunity to fly an example of the latest Mk. 5 Firefly, of the type being delivered to the Royal Australian Navy. Many British and foreign pilots have, of course, flown the various marks of Firefly, and these impressions will differ to some extent in their appeal from the customary handling notes which usually comprise this series. They are primarily intended for the many keen pilots who, unfortunately, have no opportunity to fly Service and commercial aircraft.

The Firefly has not changed basically as the various improved marks have been introduced. Even the Operational Trainer version handles much as do the other variants, although it is lighter and has cleaner wings and profits accordingly. Rather have requirements changed, and the aircraft has been re-equipped to do the job of the moment. Its day-or-night fighter role is now a secondary one in the British Navy, and reconnaissance and anti-submarine work are now its principal occupations. Additionally, however—and this was specially borne in mind when the proposal was made that I should fly and write about the Firefly—the aircraft is a highly suitable machine for "young" air forces, most of whose pilots at present lack the experience to operate effectively the jet aircraft with which they would, no doubt, like to be equipped. The Firefly is not only an operational aircraft but serves also for conversion from the trainer to the most advanced military machine. Sweden is finding that rebuilt Mk. 1s make good target-tugs.

It was some months since I had flown anything resembling the Firefly, but apart from feeling a certain restraint and in need of practice I had no cause at all for concern. Fairey's test pilot, Mr. Peter Twiss, spent about ten minutes with me in running over handling notes and the cockpit, and then we started up together. After that I was on my own.

Working round the cockpit from left to right, the important controls and switches are flap lever, tailwheel lock, trimmers, power and pitch levers (the former carrying the usual gyro gun-sight ranging twist-grip) and radiator shutter switches. In place of an undercarriage warning horn, a small red light is fitted. In front of the pilot, in addition to the flying panel and engine dials, are carried u/c lights, brake-pressure dial and ignition switches on the left, and below them the u/c lever and arrester-hook control. Centrally are placed fuel cock, booster pump switch and gauge, starter and engine cut-out buttons, and magnetic compass, while to the right are oxygen controls, electric primer and starter breech control. On the starboard side of the cockpit are electrical and armament panels, canopy winder and wing-folding selector lever. Among the many other lights and switches facing the pilot are two lights to indicate skid.

Much as I appreciate the qualities of jet aircraft, their rather depressing reek of paraffin can never compare with the vital and urgent tang of hot fumes which flow backward from the exhaust stubs of a Griffon as it starts up.

After warming up and before leaving the tarmac I ran up the Griffon 74 (four-blade Rotol airscrew) to +4 lb boost, and checked switches and pitch. For take-off (in low gear, of course) +18½ lb at 2,750

In the heading is a Mk. 5 Firefly. Below are two others from H.M.S. *Glory*, seen during recent exercises of the Home and Mediterranean Fleets. They are over Palmas Bay, Sardinia, and are N.F. Mark 5s. (see exhaust stubs and flame shields).

r.p.m. is the maximum. This produces 2,100 b.h.p. I had been advised to use about +12 lb. Taxying out over White Waltham's none-too-smooth all-grass surface was a good test for the springing, which, as might be expected of a deck-landing aircraft, is good. Brakes were smooth and powerful, and in spite of the sizeable engine ahead of the pilot they may be used reasonably fiercely without risk of nosing over. The very-wide-track undercarriage makes for stability on the ground, and the tailwheel swivels freely when unlocked. The brake lever (pneumatic operation) is on the spade grip. Incidentally, the air-intake filter had been selected "out."

A quick take-off check confirmed that the three trimmers were all neutral, airscrew in fine, fuel on main tank and full (146 gall.). Radiator shutters were put on "auto," and flaps selected one notch down for this first take-off. This is the manœuvre position, and its use on take-off, while giving some lift, results in less tendency to swing. Having lined up, locked the tailwheel and received both radio O.K. and a green from the caravan, I opened up slowly. Warning had been given of the tendency to swing to the right. This is marked, but is nevertheless easy to hold with rudder. The acceleration is quite sufficient to be exhilarating, and a small bump in the ground resulted in a slightly premature take-off, which, however, was no trouble. I remained airborne at about 85 kt I.A.S. and was very soon climbing at about 125 kt with wheels snapped up. As soon as flaps were in, speed quickly built up to 140 kt as recommended. Upping the wheels and flaps seemed to leave the trim much as it had been, though the individual movements made some momentary change. For comfort, the trimmers needed attention at each adjustment of power and speed or change of flap position.

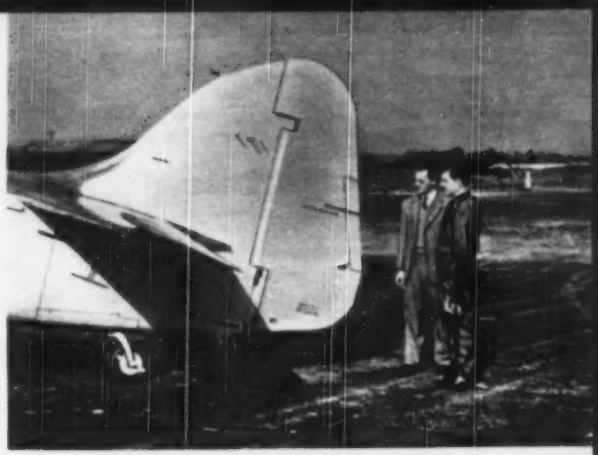
The Griffon's roar died down as I eased back to +7 lb and 2,400 r.p.m. and levelled out. My first impression was that the Firefly is livelier and lighter than I had expected—this was at around 180 kt I.A.S. Ailerons without any sort of tab aid were effective, and the aircraft could be thrown into vertical turns with no apparent effect from the external tank and radar nacelle. As speed increased, the controls, particularly ailerons, heavied-up very noticeably. In general they are rather heavier than on most comparable machines.

The Firefly becomes tail-heavy in a dive, particularly when carrying wing-slung stores, and needs to be trimmed into it to avoid high *g* on recovery. The tail trimming tabs are much more effective at high speed, but by modern standards, and as a legacy from the early Mk 1, the Mk 5 is under-tabbed.

On the climb the machine had seemed somewhat unstable, and even straight and level, after more careful trimming, it was only just possible to fly hands-off. Certainly it is less stable all round than most aircraft. This is not necessarily to be criticized, and in its trainer role the Firefly's controls and trimmers would be regarded as suitable in demanding accurate use and attention from the pilot.

Having grown accustomed to flying around I climbed to 6,000ft and tried stalls with and without flap. Some buffeting gives adequate warning of the stall, and the abruptness of the nose-drop, which after a slight pause seemed usually to be followed by the left wing dropping, increased with each additional extension of flap. With no flap the stalling speed was 93 kt I.A.S., and with full flap about 80 kt. Recovery is effected immediately action is taken. Intentional spins are not recommended—at least in operational trim—but holding a stall until a spin was just starting to develop gave an indication that recovery would be quick and straightforward.

The flaps are controlled by an unusual type of lever moving in a gated quadrant having four positions including "housed" and "fully down." The particular merits of this form of lever were obscure



Aircraft inspection, and briefing of the author before the flight.

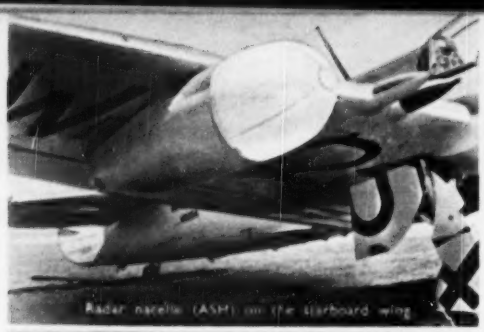
to me, and even though I was aware that the lever had to be raised slightly and pressed outwards to move between the settings, a quick positive movement from cruising to take-off or take-off to landing position was not easy to obtain on this aircraft. No flap indicator is fitted because the flaps themselves, of Youngman type, can be seen from the cockpit.

My aerobatic ambitions were more than satisfied with a roll, loop and roll-off-the-top, of which the loop made me think hardest. The roll either way at about 230 kt is easy to make, and calls for only moderate physical effort. The roll-off, too, at a little over 300 kt was not much trouble. I almost fell out of the loop; these are things that must be practised, and to a chairborne amateur pilot a little goes a long way for the first time. I personally found more than one ache in back, neck and wrist after these modest evolutions. According to pilots experienced on the Firefly, the wing-carried stores and tanks do, in fact, make an appreciable difference to rolling and general lightness of the controls.

After the aerobatics I returned to the airfield for a landing or two. When the speed had dropped below 175 kt on the circuit the so-called cruising flap was lowered, and at just under 160 kt on the down-wind leg wheels followed. Zero to +2 lb boost was required to maintain speed and height, and the aircraft was light and responsive. The turn was made at 110 kt with take-off flap, and the final approach in a light wind at about 100 kt with full flap. This speed I knew to be higher than necessary, but it was a first landing and there was plenty of field to spare. The float which followed levelling-out was not very prolonged, even though I kept a trickle of engine instead of cutting right back. It was possible to "feel" the tail down to make a three-pointer, although the elevators lost most of their positive control towards the end. The Firefly made a nice, solid sort of touch-down and remained straight and steady on the run which followed. I did not bother to brake until

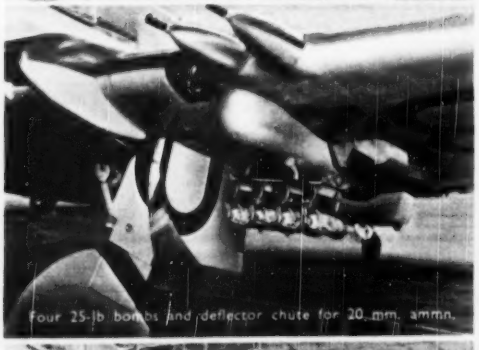
Explanation of the cockpit and controls by Fairey test pilot Peter Twiss.

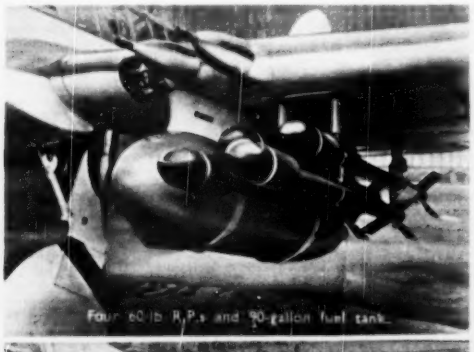
FIREFLY in the Air . . .


Radar nacelle (ASH) on the starboard wing.

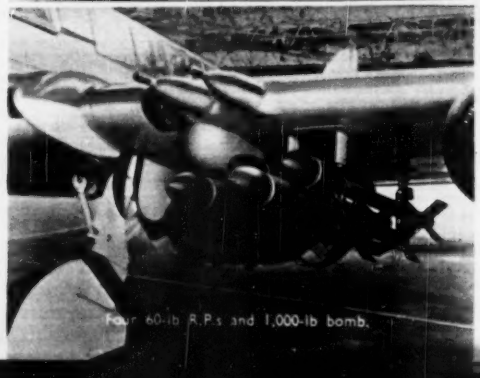
55-gallon fuel tank under port wing.

90-gallon long-range tank seen under port wing.


Four 25-lb bombs and deflector chute for 20 mm. ammn.


Four 60-lb R.P.s and 90-gallon fuel tank.

1,000-lb bomb and deflector chute.


Four 60-lb R.P.s and 1,000-lb bomb.

ready to turn off. Low-speed handling on the approach is among the Firefly's best qualities.

On the next take-off I used the full appropriate flap setting and opened up more rapidly. Again there was no doubt about the rudder's ability to keep the aircraft straight, but it did call for a fairly hefty push. This time, again with the help of a ridge on the field, the Firefly scrambled into the air after a short run. The wheels were up in a second or two and it climbed lustily skywards. The second circuit and landing followed along the same lines as the first, but the final approach was made at about 90 kt. The ensuing landing was somewhat shorter, and a considerable backward movement on the stick was required to get the tail down. Stick load was negligible.

To go round again, +9 lb boost is sufficient, and the wheels can be retracted as the speed builds up to 100 kt. Climbing speed with full flap is 110 kt and flap can be brought into take-off position at any time after one is safely settled on the overshoot, there being no sink. It is desirable to trim at each stage of flap and throttle movement.

A few notes on certain handling aspects which I was not able to try out are of interest. For a R.A.T.O.G. take-off the correct firing point for the rockets is ascertained from curves of wind speed (kt), take-off distance (ft) and aircraft weight (lb). The actual position on the take-off run at which the rockets should be fired is noted. The take-off is then as usual, but with tail kept down. The check list includes R.A.T.O.G. master switch "on."

Carrier take-offs are almost the same as those on land, but special attention must be paid to keeping straight, and the throttle is opened to +9 lb boost against the brakes. If a catapult take-off is made, it is also important always to have take-off flap setting, locked tailwheel and central rudder.

For naval aircraft, maximum range or maximum endurance may be important requirements. On the Firefly 5 the optimum-range speed is 160 kt and it is obtained by setting the power lever at the gate (full throttle or boost not exceeding +7 lb) and reducing r.p.m. down to 1,400 until 160 kt airspeed is obtained. High supercharger gear would only be used if the optimum speed was still not obtainable at full throttle and 2,400 r.p.m.

Endurance settings for the Griffon are 1,400 r.p.m. and enough throttle to give an aircraft speed of 130 kt. Reduced-speed bad-weather flying may also on occasion be

Eight 60-lb R.P.s and deflector chute.

1,000-lb bomb and American-type sonobuoys.

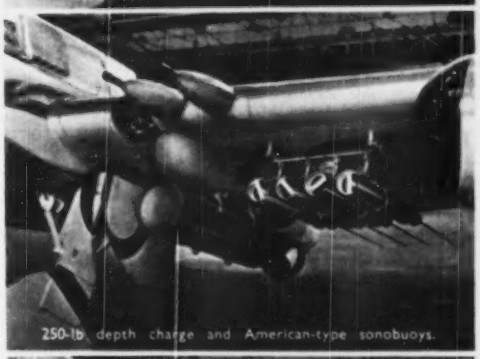
called for; with take-off flap and 2,400 r.p.m., 120 kt is the recommended minimum.

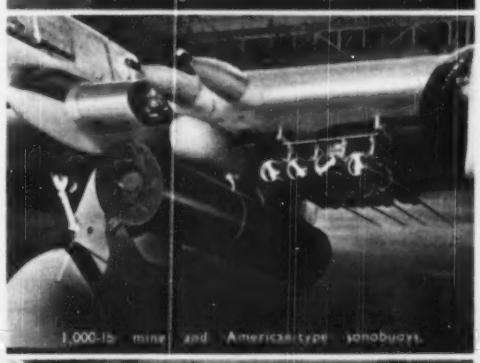
On the return to the tarmac, before stopping the Griffon and—reluctantly, it must be admitted—leaving the cockpit, I could not resist folding and spreading the wings, which, on late types of Firefly, are hydraulically operated. If one is not used to it there is always something intriguing about moving a lever in the cockpit and watching one's wings, upon which so much depends, "break" and fold neatly backwards. In the case of the Firefly, four bolts are first withdrawn manually by the ground crew, and a small red-and-white indicator, just outboard of the radiator on the wing upper surface, indicates that the latch pins are no longer engaged.

THE FIREFLY'S ARMAMENT

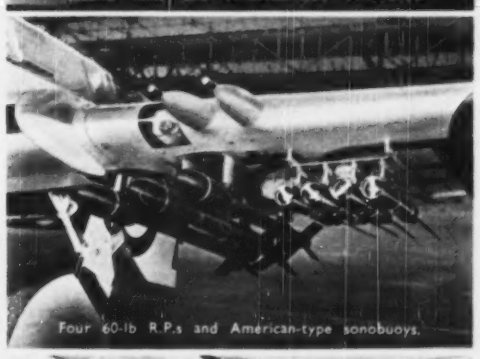
IN the accompanying sequence of photographs, depicting alternative armament and drop-tank loads, special interest attaches to the sonobuoy installations. The sonobuoys shown are of American pattern, designated as AN/ARR-3, and have a transmitting range of approximately ten miles. Details are withheld, but in general it can be said that sonobuoys are released in quantities round a suspected area. They descend by parachute and on impact with the water each buoy releases a hydrophone device. The strength of radio signals transmitted varies according to the distance of the buoy from the submarine, the position of which can thus be plotted.

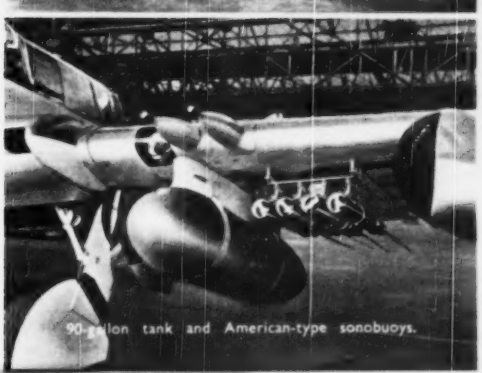
Rocket projectiles are carried on zero-length rails, in which the front suspension incorporates a slip-hook and the rear a short fore-and-aft slot into which fit extension lips from the rocket tube. This arrangement, whilst having the advantages of less weight and less drag than R.P. rails, further allows the carrying of eight projectiles under each wing, in two banks of four each.

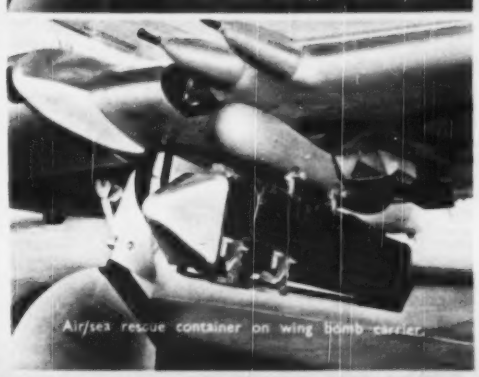

250-lb depth charge and American-type sonobuoys.


1,000-lb mine and American-type sonobuoys.

American-type sonobuoys (total of twelve carried).

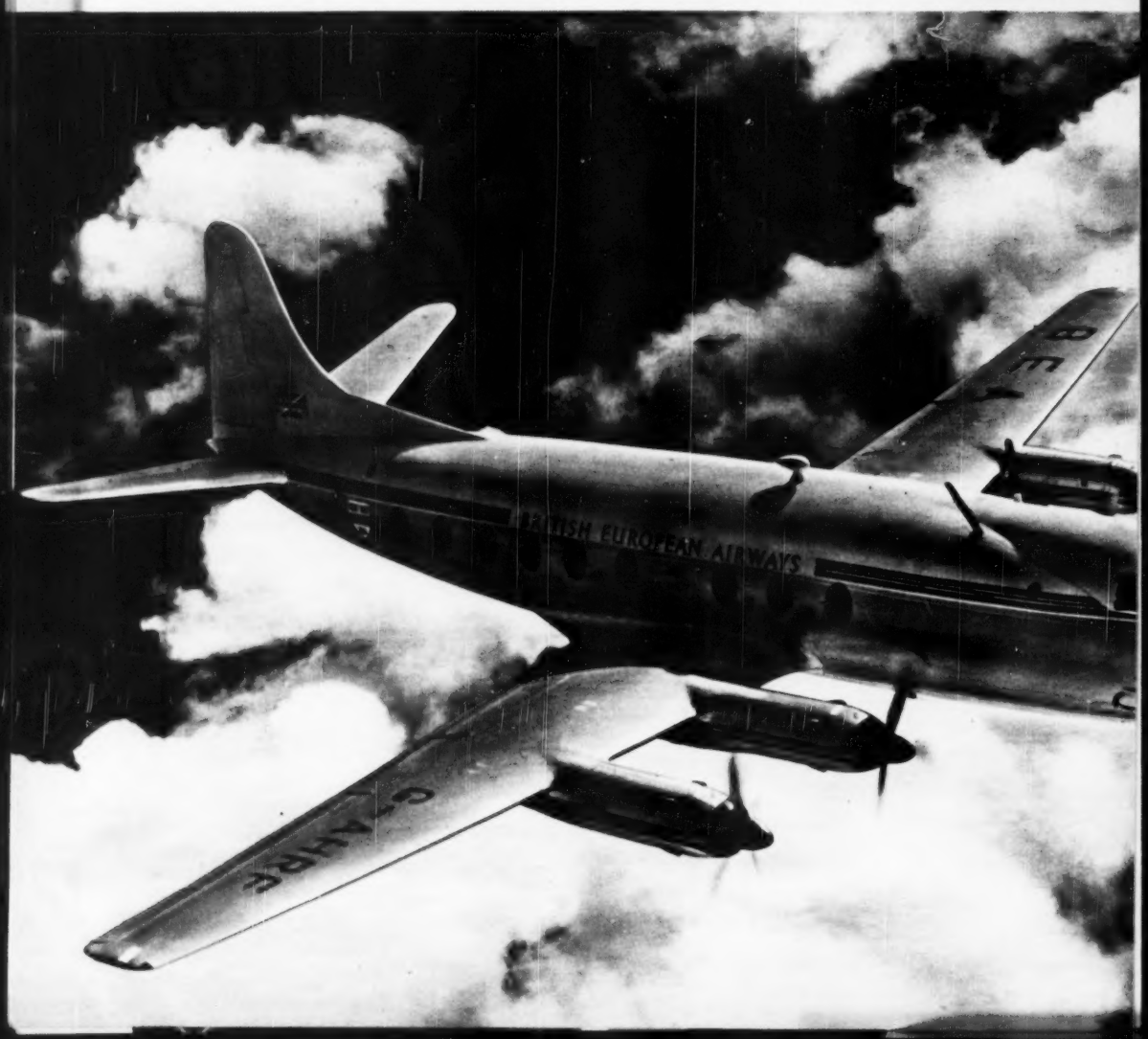

Four 60-lb R.P.s and American-type sonobuoys.


90-gallon tank and American-type sonobuoys.


Air/sea rescue container on wing bomb-carrier.

"— As Handsome Does"

The Fine Lines of the Turboprop Viscount and Turbojet Comet, Bespeaking the Efficiency of these Unchallenged British Airliners, are Seen to be Enhanced by Tasteful Application of Markings



(1) Posed for the air-to-air camera before departing on the European tour now in progress is the Vickers-Armstrongs Viscount (four Roll-Royce Dart turboprops) finished in the new B.E.A. colours—white upper-works and silver grey side-and under-surfaces, the two colours divided by red lines—and bearing, in addition to the B.E.A. "key," the Corporation's coat of arms and the Union Jack. (2) Though no markings are visible as the D.H. Comet (four Ghost turbojets) approaches low, the unmistakable configuration of the aircraft is, in itself, a trade-mark. Note in the side-view (3) how the markings do, in fact, accord with the Comet's lines. Kastrup is the setting.

FOR WHOM THE BELL RINGS

Or, Confessions from the Domestic Component of a Civil Aircrew

BY JO WOODWARD

All those Mrs. Worthingtons who have heeded Mr. Noel Coward's advice on their daughters' careers may find inspiration in this article. Written by an air hostess of 3,000 hours' air experience, it will interest not only women readers of "Flight" but men as well, for it is an entertaining and revealing story.

WHEN a girl has a year or two to spare before taking up a permanent job and wants to see the world at someone else's expense, an air hostess' job provides a very satisfactory answer. One cannot make a career of this type of work—it is far too strenuous to carry on for more than a few years—but it is a very worth-while experience for those who care for flying and have the urge to travel.

Being an air hostess is by no means the glamorous job which popular magazines would have the public believe. For most of us, when the novelty has faded from shopping in such far-away places as Buenos Aires and Damascus, or from taking pot-luck in Tanganyika bush, our main consideration at the end of a day's flight is whether we can get a comfortable bed and a hot bath, or whether we shall have to risk being bitten by bugs, cleaning up in the brown mud of some African shower-baths, and dining off what can only be camel steak!

Many people forget that there is a domestic side to the job—indeed, that the greater part of it is extremely hard work. A certain selection board for air hostesses, of which I formed part, still likes to recall the glamorous blonde who, swaying into the board-room in feathers and furs, replied, on being asked why she wanted to be an air hostess, "I've just seen the film 'Broken Journey' and it was all *too marvellous!*"

Nowadays a hostess is given a very comprehensive training before she becomes airborne. This includes instruction in aircraft catering and documentation, passenger-handling and psychology, first aid, immigration, currency and health regulations, and a rough knowledge of met. and of the technicalities of flying. She is put on a training flight with a fully experienced hostess and thoroughly drilled in the procedure "down the line" before she takes over on her own.

When I left the W.A.A.F. early in 1946 to take up civil flying, air hostesses were comparatively unknown in this country. I joined a corporation which was opening up the South American route with Lancastrians. No one had the experience to give the hostesses much practical training. I knew very little about aircraft documentation and even less about catering. I climbed into the aircraft with thirteen passengers and five crew, a mass of catering equipment and a huge case of ship's papers, while someone outside said, "Sorry we can't tell you more about it. You'll have to go to South America and do the best you can. Good luck!" The door was shut and off we went. Even mascot Pete (see heading picture), who had watched over me everywhere since 1940, and had made trips in Service aircraft, seemed to be taking a dim view of the prospects.

I settled the passengers, handed out magazines, cotton wool, pillows and rugs. I went into the galley to prepare a four-course lunch for eighteen people. I couldn't think where to

The author, sampling the commodore's quarters in one of the Vikings of the King's Flight, dreams of luxury accommodation for air hostesses. (Right) Off-duty hour on the rocky coast of Malta

A 35,000-MILE MARATHON

A Marathon feeder-airliner is making a 35,000-mile world tour. Its capabilities are being demonstrated in New Zealand, Australia, India, Pakistan, the Middle East, North Africa and Europe during the first months of 1950.

A greater payload is carried by the dual-purpose Marathon than by many larger aircraft. It will fly 4,000 lb. of freight or a maximum of 22 passengers and their luggage for stage distances of 500 miles at cruising speeds between 160-210 m.p.h. And its performance exceeds I.C.A.O.'s safety specifications.

HANDLEY PAGE

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— said the Managing Director,

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(And here our Managing Director was brought to a stop by peal upon peal of applause from our staff mixed with many loud interjections which we hope we mis-heard.)

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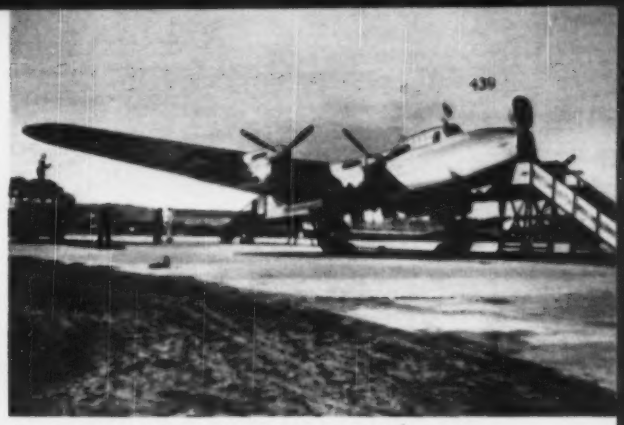
CBC 211

An Airwork Viking on the tarmac at N'Dola, Northern Rhodesia.



A converted bomber, the Lancastrian offered sparse comfort.

FOR WHOM THE BELL RINGS . . .

start and prepared to go into a complete flap. A V.I.P. passenger rang his bell and asked for a drink.

I took him some whisky and a bottle of soda water, but I hadn't been briefed that, when a bottle of soda water is opened in the air, it should be held at an acute angle. A surprised V.I.P. was hit squarely in the face by a miniature fountain which cascaded down his beautiful lounge suit. I would willingly have baled out! But the victim, obviously well aware of my newness at the job and consequent panic, began to laugh. I had to join him, and from then on muddled along happily until things began to sort themselves out.

In those converted bombers nothing was easy for the hostess. With the galley between the main and rear spars, a two-foot-six barrier had to be negotiated each time she went down to the passengers. Serving a four-course meal over this obstacle was no mean achievement, and we wore divided skirts for the purpose.

I remember long, cold hours over the South Atlantic at night. While the passengers slept I sat wrapped in great-coat and blankets in the galley (to which the heating system did not extend), my feet in the oven to keep warm, working out bar accounts in a mixture of escudoes, pesos, cruseiros, dollars, West African and English currency, falling asleep over them at intervals and getting a different answer every time.

One night, on take-off from Bathurst in Gambia, the galley hatch blew off as the aircraft left the runway. The galley was barely 5ft high, and as the hatch was directly above the most operational part I was compelled to sit under the open space. My hair stood up perpendicularly in the suction—an extraordinary sensation. Several times we ran into rough weather and the captain called me to the cockpit to prevent me being blown out! Each time we ran through a storm I had to bale out several inches of rain-water before continuing with my work. With the galley directly behind the blast of four Merlins, and the terrifying suction above my head, that nine hours' flight was nine hours' nightmare, but the passengers did not suffer much and had hot gammon rashers and mushrooms for breakfast.

In spite of these difficulties, we always had confidence in the Lancastrian, remembering the wartime record of its forbears.

In August, 1946, I left the corporation and joined a charter company to try out an entirely different type of passenger flying. Different, I should say, not in passenger service, but in the general operation of the company, in which I was able to take a much more personal interest. When the corporation had been operating a short time and developed into a very efficient organization with its own ground staff at every landing field, the air hostesses were comparatively spoon-fed. I would step off the aircraft, hand over passengers and ship's papers to the traffic officer meeting the aircraft, give an order to the catering section and keep a watch on the cleaners. After that my time was my own and I had no further responsibilities.

This was not the case in a charter company. Each time we visited a new place the whole crew made it their business to find out which were the best possible facilities for maintenance to catering. We had to appoint handling agents and, where more than one was available, find out who was both efficient and economical, for a charter company has no Government subsidies and must watch every financial detail, at the same time providing the passengers with every available comfort. Accommodation and catering to our own specification were major problems on which the air hostesses had to make careful reports. And, above all, there was the problem of finding and supervising cleaners . . .

Whenever I hear someone sigh romantically about the glamour of an air hostess's life, I think about cleaners! Many a time, dripping with sweat in the southern territories of the Sudan, or brushing off myriads of flies in the dazzling white glare of Saudi Arabia, I have shouted at, cajoled, bribed, and finally helped the native cleaner boys to take out the Elsan—anything but a savoury job—and stood over them while they swept out the aircraft, emptied waste-bins and filled up water tanks, muttering to myself, "What price glamour now!"

It has been fun flying with a charter company. We found a great deal of good will towards us everywhere, and many people who, before ground organizations were fully established on a number of the airfields we visited, cheerfully volunteered to help us. A large measure of our thanks is due to the R.A.F. in North Africa and the Mediterranean areas, who were grand. We took them the latest newspapers and magazines, and in return they provided us with food and accommodation when it was needed and helped with everything from aircraft maintenance to taking over children and rigging up clothes-lines for nappies.

An interesting feature of charter flying has been contact with, and watching the development of, independent airline companies overseas. Sudan Airways is an excellent example. This young airline was not formed when our company first visited the Sudan in 1946. We watched the traffic division built up by a handful of B.O.A.C.-trained Sudanese under English supervision, and saw the development of the operational and maintenance side of staff carefully selected by Airwork, Ltd., until the whole began to operate as a highly efficient body. At first there were the usual moans and groans from visiting air hostesses about aircraft cleaning, catering and documentation, but the snags inevitable in the development of a new company soon began to fall into line. Now an air hostess can step off an aircraft in Wadi Halfa or Khartoum knowing that everything from the passengers' luggage to the aircraft log book can be left safely in the hands of the local Sudanese traffic officer without her constant supervision. We like to visit airfields in the Sudan where we are sure of a welcome by the ground staff whom we know well, and to lob in on the sun-baked strip of a place like El Fasher, far over in the western corner of the Sudan, where the arrival of an aircraft is a major event, and all the local English inhabitants turn out to greet the crew, ply them with cups of tea and hear the latest news from home.

It is always a pleasure to find oneself in the hands of a competent ground staff at the end of a long day's flying,

FOR WHOM THE BELL RINGS . . .

for a day in the air is exhausting and exacting. In addition to the meals, worries and welfare of twenty-seven passengers, and the endless questions about customs, passports, currency and luggage, there is the washing up! A sobering thought for a glamour-lover is that on an average day's flying an air hostess washes up about a thousand separate items. I always welcome passengers who volunteer to help with the chores and reward them with an extra noggin from the bar box.

Passengers themselves are the main contributory factor towards making a trip pleasant for an air hostess. My number one favourites are old ladies—particularly old ladies on their first flights. I like to see their expressions change from slight apprehension on take-off to a comfortable contentment when magazines and cups of tea are brought round. I remember one delicious old thing who, at the completion of her first flight, asked to be taken to the captain. Before a delighted crew she shook the astounded skipper warmly by the hand. "Young man," she said, "I simply must congratulate you. It was so clever of you, every time you landed, to come down *right on the runway!*"

Working for a charter company is all the more amusing because of the great diversity of passengers. I have had them varying from diplomats to dipsomaniacs, and from Siamese cats to eastern seamen. I must admit that I do not feel equally friendly towards them all!

I once accompanied a party of small boys from Kenya to the United Kingdom. They ran on to the aircraft shouting to each other, "I bet I'm sick before you." Such was their apparent enthusiasm to achieve this curious objective that in despair I promised a shilling to anyone who was not sick at all. It was an expensive trip . . .

On another occasion, when the aircraft was tossed about violently in a storm, a foreign gentleman rang for me. Struggling to keep my feet I reached his seat. He placed in my reluctant hand a revolver which was, he said, fully loaded and had no safety catch. He wished me to have it, he explained, in case it went off on his pocket in one of the bumps!

The most colourful and unusual passengers I have had were Mohammedan pilgrims making the great Haj, or pilgrimage, which every true Mohammedan must make once in his lifetime, to the Holy City of Mecca. From Kenya and Tanganyika I accompanied Indians wreathed in jasmin, the men in snow-white pilgrims' robes and their women in gorgeous saris. From Nigeria, the Gold Coast and Sierra Leone came fine old native chieftains, tall, dignified, their faces seamed and lined with tribal scars. Many of these had never seen the sea. When we crossed the desolate coast of the Sudan and below us lay the shimmering sheet of the Red Sea, they called me and asked what it was. I told them, and watched their faces as they crowded to the windows, like children in their excitement. But after twenty minutes' flying, when nothing was to be seen but sea and sky, they held council and called again. "You are wrong," they told me gently, "there cannot be so much water in the world."

I have often been asked which of the countries I visited, from India to the Argentine, I like the most. Each has its own attractions. For shopping—or for me shop-window gazing—and for wonderful food, I found nothing to compare with Buenos Aires. This is a millionaires' city with its wide, tree-lined streets, beautiful hotels and elegant shops filled with every luxury from sheerest nylons to extravagant gowns. Rio de Janeiro is a paradise from the air—a glittering city dominated by the Sugar-loaf Mountain and bounded by the silvery stretch of the famous Copacabaña beach. (My happiest recollection of Rio is of ordering—and getting—a pint glass of pure orange-juice!)

From the opulence of South America I flew eastwards and saw the bazaars of Damascus and the *souks* of the Lebanon, where Syrian vendors display their brocades and perfumes, and Arab craftsmen beat out golden ornaments in dark little shops and narrow streets which can scarcely have changed since the beginning of time. In Baghdad I saw the setting sun glinting on the gold dome of the great mosque, and in the desert of Iraq walked by the Eternal Fires. These fires, says the legend, mark the spot where Shadrak, Meshak and Abednego were thrown into the fiery furnace. They cannot be extinguished and proved a black-out problem during the war, but are known now to be due to the escaping gas from the neighbouring oilfield of Kirkuk rather than to any supernatural source.

The Wayfarers in which the author served had a 24-passenger interior layout which allowed room for a built-in bar and running buffet that was popular with stewardess and passengers alike. The galley, however, was small, while serving the crew entailed a vertical-ladder climb to the flight deck.

In Omdurman I was taken to dinner with the Khalifa Sherif, descendant of the famous Khalifa who fought with and finally took over the rule from the Mahdi whose dervishes murdered General Gordon. I hoped that this would be an oriental meal with the guests sitting on cushions on the floor and dipping their fingers into a central dish. But the Khalifa and his Sudanese friends sat on the terrace at a long candle-lit table laden with polished glass and silver, and ate a European meal of soup, fish and roast turkey. The turkey, however, made up for the disappointment, for it was carved into small slices which were then put back so that the bird appeared to be intact. I had to be prodded by my neighbour, a Sudanese judge, before I discovered how to tackle a seemingly whole turkey with the proffered spoon and fork!

I loved the rolling highlands of Kenya, and in the game reserves outside Nairobi saw many wild animals, among them lion, giraffe, zebra and buck. Farther north in the elephant country of Bor I saw elephant, and, on one exciting occasion, a rhino. The Bor herd sometimes roams across the airfield of Juba. We landed one day at Juba and saw that the passenger terminal—a grass hut—was leaning drunkenly to one side. I asked the traffic officer what had happened. "Oh, an elephant leaned against it," he said, without looking up from his work. And it was true! I was also thrilled to discover, before we took off at dawn from Tabora in Tanganyika, that the airfield controller carried out a "lion patrol" in his Jeep, to drive away lions which sometimes play on the runways in the early morning.

I think that the most fascinating place I have seen is the old walled city of Kano in Nigeria. This is said to be the largest walled native city in the world, and a meeting place for the desert caravans from all over Africa. The houses here are like children's sand-castles, some with flat and some with domed roofs, and having tiny crooked turrets on each corner. Intricate patterns are carved down the walls, and—usually for native houses—window frames are set in or even painted on the walls to match the gaily coloured doors, all of them deliciously crooked. I do not believe that there is a straight line in the native quarters of Kano.

I have enjoyed my three thousand hours as a hostess, but have not yet gone far enough. My ambition is to visit the U.S.A., the Far East and the South Pacific Islands. I would like to go round the world at least three times. But between you and me—the nicest thing about being an air hostess is sitting on the ground and shooting a line about it!

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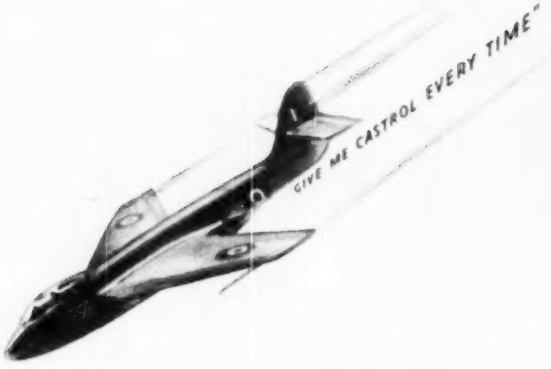

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CIVIL AVIATION NEWS

FIRM ACTION OVERDUE ?

AN application by Civil Air Transport (Inc.), the company operated by General Claire Chennault, which was seeking an injunction to prevent the Communist-controlled Chinese Airways Corporation from removing 71 grounded aircraft and other assets from Hong Kong, has been dismissed by the acting Chief Justice of Hong Kong.

As reported in *Flight* of March 9th, General Chennault claims that he had purchased these aircraft from their former Nationalist owners. He has indicated his intention of appealing against the Court's decision. The aircraft are still intact at Kai Tak airfield, and while the Communists are reported to have taken some spare parts and miscellaneous equipment, no move has been made to prepare them for flying away, although it appears that there is no longer anything to prevent them from doing so.

Meanwhile, the decision has evoked considerable criticism in America. The State Department is being subjected to a great deal of pressure from certain groups of Congressmen who feel strongly about the matter. Some of them go so far as to suggest that the flow of B-29 bombers to Britain should be stopped unless the decision is reversed. One Senator has asked "why give Superfortresses to Britain to strengthen the anti-Communist forces in Europe, when the same country is preparing to increase the striking force of Communists in the Far East? We do not think the State Department has been aggressive enough in trying to keep these American-built aircraft out of Communist hands." The matter was discussed at a confidential session of the Senate Appropriations Sub-Committee, which is considering funds for the armed forces; it is understood that the committee members have demanded further information from the Assistant Secretary of State for Far-Eastern Affairs.

T.C.A.'S REPORT

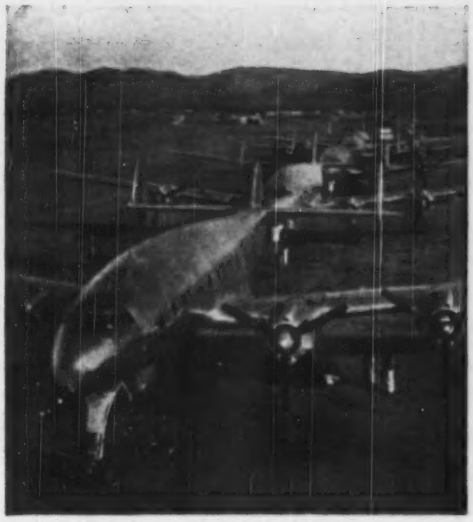
ALTHOUGH the number of passengers carried on the entire T.C.A. system increased by 21 per cent over last year's figures, and the ton-mile volume of freight and mail exceeded the previous year's by 50 per cent, the financial results for the calendar year 1949 reflect the heavy seasonal fluctuations in traffic and the rising costs which are now prevalent in the air transport industry. The greatly increased amount of work done by the airline last year was accomplished without additions to its fleet and with a negligible increase in staff.

The company's report considers that the outstanding accomplishment of the year was the high regularity performance, the peak figure being attained in August, when 91 per cent of the 6,380 departures were made dead on time. Approximately 97 per cent of all scheduled mileage was completed.

On North American services the major traffic statistics of interest include some 648,574 passengers carried, and 310,700,000 passenger-miles flown out of 459,840,000 seat-miles available. The passenger-mile figure represents an increase of 24 per cent over that for the previous year, and the revenue ton-mileage (35,844,000) was 27 per cent higher than that of 1948. Capacity ton-mileage was increased by approximately 30 per cent during the year. Considerably greater utilization was made of the existing fleet (20 North Stars and 27 DC-3s) on North American routes.

During the year seating capacity of the DC-3s was increased from 21 to 28 and the company also converted to military specifications, and returned to the R.C.A.F., five North Star Mk Is which had been loaned by the Government for earlier use on overseas routes.

On Atlantic services, including operations to the Caribbean and Bermuda, the revenue passenger-mileage decreased by 5 per cent to some 95,712,000, but the number of passengers carried (36,512) represented an increase of 11 per cent. Although capacity was increased by 11 per cent, the revenue ton-mileage rose by only one per cent. T.C.A.'s overseas route network now totals 8,303,000 miles.



STILL CHURNING : With the 200th aircraft scheduled for delivery this summer, the production line of the versatile Constellation remains in operation at the Lockheed factory. Of the world's major airlines 14 are using this type of equipment.

The year's financial results were somewhat disappointing. Although the company's North American section increased its revenue by 27 per cent, operating expenses also rose by 28 per cent, resulting in a deficit, after payment of depreciation and interest, of $1,419,444. On Atlantic services revenue decreased by 6 per cent, and operating expenses rose by 4 per cent; the deficit amount to $2,898,149 as compared with $1,750,218 last year.

The report considers that, assuming no serious deterioration of world economic conditions, the operating results for 1950 should show a marked improvement; to this end T.C.A. is concentrating on reducing maintenance and overhaul costs.

ACCIDENT INVESTIGATIONS

REPORTS of the investigations into the circumstances of two accidents which occurred last year have been published by the M.C.A. The first concerns the incident in which Skymaster G-AJPL, owned by Skyways, Ltd., crashed at Castel Benito airport on February 4th, 1949. Captain R. W. J. Kitley, the pilot, was killed, and seven crew members and 21 passengers injured; the remaining 23 escaped without injury. The aircraft, which had been chartered by the War Office to transport personnel from Nairobi to the United Kingdom, left Khartoum at 1905 hr on February 3rd, to make the 1,700-mile crossing of the Libyan desert to Castel Benito. Most of the flight was in clear weather, but thundery showers were encountered in the last 200 miles. The pilot let down through cloud to the west of Castel Benito in heavy rain, with a visibility of approximately two miles. At about 700ft, when descending towards the airport, the port outer engine failed, followed a few seconds later by the port inner. The aircraft continued to lose height and crashed into trees close to the airfield. Although fire broke out, it was confined to the starboard wing, which was lying away from the main wreckage. The cause of the accident is attributed to the failure of the captain to maintain a safe height by utilizing the available power of the starboard engines after failure of the port engines brought about by insufficient fuel in the tanks on that side. This fuel shortage, it is stated, was the result of the wing tanks being allowed to become progressively unbalanced during the last stage of the flight. An attempt by the flight engineer, under emergency conditions, to cross-feed the port engines from the starboard tanks failed owing to the full operation not having been completed in time.

The Board considers that the amount of fuel carried (1,980

CIVIL AVIATION NEWS . . .

gallons) was insufficient to ensure an adequate margin of reserve for the sector to be flown; it also emphasizes that, in multi-engined aircraft, it is of importance that the correct method of handling the fuel system should be rigidly adhered to in order to prevent engine failure through air entering the system. The report adds that, under the prevailing conditions and at the all-up weight obtaining at the time of the accident, this type of aircraft should be capable of being freely manœuvred with any two of its engines inoperative.

The second accident occurred to Rapide G-AGPI, owned by Somerton Airways, Ltd., which, when landing at Cowes, touched down on the runway and attempted to go round again. Due to a tail-wind component of 8-9 knots, the aircraft failed to gain sufficient height, struck a tree on the airfield boundary, and crashed in a field beyond. The accident was attributed to errors of judgment on the part of the pilot, who misjudged the approach and did not take overshoot action until it was too late. Several of the passenger-seats broke away, and it was later found that the welded attachments (not of de Havilland manufacture) to the floor-plate were defective. The pilot and passengers escaped with injuries.

GROWTH OF BRITISH AIRMAIL

STATISTICS for the financial year 1948-1949, issued by the Post Office, show that the total number of inland letters carried by air during that year was 69,400,000, an increase of almost 70 per cent on the figure for the previous year. The increase was due mainly to the growth of traffic on mail services to and from Ireland and to Scotland. Civilian mail to overseas points increased by 30 per cent from 99 million items in the previous year to 129 million in 1948-49. The improvement was attributed mainly to the introduction on July 1st, 1948, of an "all-up" service to the greater part of Europe. Under this arrangement all first-class mail, including postcards, is sent by air without additional charge whenever delivery can be expedited by doing so. With the extension of the lightweight sixpenny air-letter service to French overseas possessions, this service became available to all extra-European destinations.

British Airways' Operating Statistics for December, 1949

(Figures for the corresponding period in 1948 are given in parentheses)

	B.O.A.C. All Divisions	B.O.A.C. Western Division	B.O.A.C. Eastern Division	B.O.A.C. South American Division	B.E.A. All Divisions	B.E.A. British Division	B.E.A. Continental Division
Total revenue aircraft-miles	2,211,921 (2,731,049)	298,259 (272,176)	1,467,758 (1,947,383)	445,904 (511,489)	1,206,577 (912,327)	339,613 (313,891)	866,964 (598,436)
Total aircraft miles	2,438,215 (2,949,193)	375,216 (330,066)	1,592,829 (2,044,079)	470,170 (575,048)	1,243,802 (941,979)	350,256 (323,727)	893,546 (618,252)
Revenue passengers carried	12,034 (12,201)	2,217 (1,766)	7,653 (7,287)	2,164 (2,439)	41,125 (28,556)	18,790 (16,592)	22,335 (11,964)
Revenue passenger miles	33,457,036 (33,165,747)	5,631,880 (4,136,328)	24,832,160 (23,942,400)	2,992,996 (5,087,019)	12,585,683 (8,899,281)	3,337,187 (2,853,062)	9,248,496 (6,046,219)
Available seat-miles	57,590,342 (55,355,579)	10,696,218 (6,895,831)	38,867,066 (37,851,095)	8,027,058 (10,608,653)	22,631,131 (15,010,487)	6,926,654 (4,934,996)	15,704,477 (10,075,461)
Revenue passenger load factor (per cent)	58.1 (59.9)	52.7 (60.0)	63.9 (63.3)	37.3 (48.0)	55.6 (59.3)	48.2 (57.8)	58.9 (60.0)
Cargo carried (tons): Mail	212.4 (213.7)	57.1 (43.2)	139.9 (146.2)	15.4 (24.3)	493.8 (360.2)	160.9 (136.8)	332.9 (223.4)
Freight	359.3 (374.9)	58.1 (52.0)	246.5 (255.5)	54.7 (67.4)	562.7 (440.0)	164.2 (108.3)	398.5 (331.7)
Total revenue load ton-miles	5,738,419 (6,027,537)	925,026 (699,063)	4,191,683 (3,924,997)	621,711 (915,481)	1,554,187 (1,127,122)	331,599 (271,385)	1,222,588 (865,737)
Total usable capacity ton-miles	10,173,449 (9,292,472)	1,629,439 (1,136,871)	6,610,205 (6,250,804)	1,770,713 (1,652,792)	3,578,137 (1,821,164)	634,474 (449,184)	1,943,663 (1,371,980)
Overall revenue load-factor (per cent)	57.4 (61.3)	57.4 (62.1)	63.4 (62.8)	35.1 (55.4)	60.3 (62.4)	50.7 (60.4)	63.4 (63.1)
Total revenue hours	10,361 (14,473)	1,266 (1,259)	7,108 (10,694)	2,320 (2,322)	8,262 (6,455)	2,935 (2,827)	5,327 (3,628)
Total non-revenue hours	1,299 (1,278)	369 (313)	796 (606)	134 (359)	708 (478)	111 (99)	180 (125)
Equivalent annual utilization (revenue hours) per aircraft	1,528 —	— —	— —	— —	1,080 (1,015)	833 (906)	1,316 (1,725)
Unduplicated route miles in operation at end of period	71,447 (91,408)	7,725 (8,523)	43,782 (58,698)	19,940 (24,187)	12,528 (11,820)	2,575 (2,265)	9,953 (9,555)
Percentage regularity	96.6 (98.0)	94.7 (93.5)	95.7 (99.5)	100.0 (95.3)	95.1 (92.2)	96.5 (95.5)	93.4 (88.1)
Average length of stage flight (miles)	1,048 (1,017)	1,171 (1,101)	1,091 (1,023)	876 (952)	221 (197)	117 (107)	368 (417)

AS shown in the table above, the British Airways Corporations, and B.E.A.'s associated operators, carried 54,000-odd passengers during December, 1949. This figure represents an increase of 31.4 per cent on the result for the corresponding month of 1948. There were also increases of 9.7 and 14.3 per cent in the totals of revenue passenger-miles and available seat-miles respectively. The total of revenue aircraft-miles flown, however, decreased by 4.4 per cent. Expressed as a total of all services, the passenger load-factor decreased by 2.5 per cent; and the overall revenue load-factor also dropped from 61.5 to 58 per cent in December, 1949.

Of these totals, B.O.A.C. flew 33,457,000 passenger-miles, more than six million of which were achieved on Western Division routes, an increase of over 500,000 miles on November's figure. B.E.A. recorded some 12,586,000 passenger-miles, an increase of 41.4 per cent on last year's figure; the number of passengers carried by the Continental Division increased by 86.7 per cent from the total for December, 1949. Companies operating under associate agreements with B.E.A. flew approximately 95,000 passenger-miles as compared with only 3,000 last year.

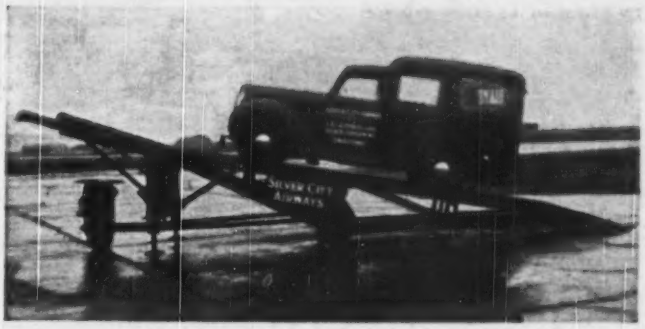
Summary for 1949: Using provisional figures for the month of December, a table of the more important operating statistics has been prepared for the calendar year 1949. These totals provide some interesting comparisons. The number of passengers carried by both Corporations and their associates increased by nearly 30 per cent, passenger-miles by 11 per cent and the freight and ton-mile figures by 17 and 6 per cent respectively. In the table—given below—last year's figures are shown in parentheses, together with the percentage change.

	B.O.A.C.	B.E.A.	Total of Corporations
Aircraft-miles	27,698,000 (31,745,000) − 12.8	15,161,080 (12,353,000) + 22.7	42,849,000 (44,097,000) − 2.8
Capacity ton-miles	110,800,000 (99,818,000) + 11.0	34,406,000 (24,994,000) + 37.7	145,205,000 (124,811,000) + 16.3
Passenger-miles	406,356,000 (403,480,000) + 0.7	201,062,000 (150,726,000) + 33.4	607,417,000 (554,206,000) + 9.6
Mail ton-miles	8,976,000 (8,989,000) − 0.2	1,587,000 (949,000) + 67.2	10,563,000 (9,938,000) + 6.3
Freight ton-miles	15,113,000 (13,344,000) + 13.3	2,758,000 (2,176,000) + 26.8	17,877,080 (15,520,080) + 15.2

SWISSAIR IN 1949

THE large operating loss of 5 million francs (approximately £400,000) incurred by Swissair in 1949, and the comparatively poor prospects for 1950, has caused the company to ask for Government assistance to assure the future of commercial aviation in Switzerland. Last year's unfavourable results are attributed mainly to the fare reductions in most European countries which have followed devaluation. An official statement says: "The outlook for 1950 is particularly unfavourable inasmuch as the reduced fares remain in force. In spite of reductions which will be made in the operations programme and economy measures which will be taken, an operating loss of several million francs must be foreseen, assuming that flight frequencies remain unchanged."

Swissair's executive council has approved plans to reduce the number of scheduled services, dispose of a number of aircraft, and effect a corresponding decrease in personnel. The fleet consists of DC-3s, DC-4s and Convairs. Last year, the company flew some 5,351,000 aircraft miles and carried 153,800 passengers with a creditable regularity percentage of 98.9. The Swissair route network covers over 23,000 miles, and at the moment the company is participating in trans-Atlantic traffic to the extent of two flights per week in each direction from Zurich to New York via Shannon and Gander.



THIS WAY UP: This mobile loading ramp developed by Silver City Airways for their Channel car-ferry service, which was restarted on April 1st, can be easily manœuvred by the "mechanical moke" fitted to the front end

BREVITIES

THE Parliamentary Secretary to the Ministry of Civil Aviation, Mr. Frank Beswick, M.P., has appointed Mr. R. F. Prosser, M.C., to be his Private Secretary.

* * *

Further details are now available of the Martin 4-0-4s, of which, as mentioned in *Flight*, March 16th, 65 were ordered by T.W.A. and Eastern Airlines. The aircraft will be operated at a gross weight of 43,000lb, and fuel capacity is being increased to 1,350 U.S. gallons, as compared with the 1,010-gallon capacity of the 2-0-2.

* * *

In *Information Circular No.* 28, the M.C.A. announces that the Air Navigation (Radio) Regulations, 1949, which affect the maintenance and certification of radio in public transport aircraft, are at present under review. Pending the issue of revised regulations it has been decided to cancel the existing Section 4, which was due to come into effect on April 1st.

* * *

B.O.A.C. announces the sale of 11 Plymouth flying-boats and five Liberators, all to one purchaser who, for the moment, has elected to remain anonymous. In addition, five Tudor Vs were sold to another buyer. B.O.A.C. had previously stated that, unless the Plymouths were sold by the end of January, their high cost of maintenance would make it necessary for them to be broken up.

* * *

This year the public will again be given an opportunity of viewing at close quarters the activities of State-owned airports, and thirteen enclosures will be opened before Easter. Last year more than 850,000 people visited the airfields, more than half a million going to London Airport and Northolt alone. At London, Northolt, Croydon and Blackpool visitors will be able to make short pleasure flights, and similar facilities will in due course be organized at other airports.

* * *

On his return from Lisbon, where, as reported in *Flight* of March 30th, he was making an "on-the-spot" check of traffic arrangements, the chairman of B.O.A.C., Sir Miles Thomas, denied that the Civil Aviation authorities there were placing restrictions on the Corporation's passengers. He said that, on the contrary, he found the Portuguese officials extremely co-operative, and disagreements had been settled.

* * *

To meet the demand for bookings to Europe and Scandinavia this summer, A.O.A. announces that the number of trans-Atlantic flights will be almost doubled. From June 1st frequency of the New York-London service will be increased from seven to eleven flights weekly, this permitting 660 passengers to fly to London each week. All scheduled aircraft in March were filled to capacity, and several extra flights had to be made. The company reports that, of last month's passengers, nearly 70 per cent took advantage of the special 15- or 60-day reduced excursion rates.

Delegates at the annual general meeting of I.A.T.A., which will be held in San Francisco from October 18th to 20th, are being invited to Oakland Airport to commemorate the first commercial flight across the Pacific.

* * *

The French Minister of Postal Services announced on March 29th that an air mail service without extra charge would soon be re-established between France and Britain. Incidentally, arrangements are also being made to receive subscriptions for British newspapers and periodicals at French post offices.

* * *

The Societa Anonima Aerea, which represents the Czechoslovakian aircraft industry in Italy, announces that 15 single-engined Sokol and four twin-engined Aero 45s have been sold there. Furthermore, a number of Italian prototypes have been fitted with Czechoslovakian engines.

* * *

The South African Minister of Transport has stated that S.A.A. may show a small surplus of revenue over expenditure for the financial year ended March 31st. Although the figures from April to October showed high monthly losses, the position was to some extent alleviated by B.O.A.C.'s quarterly adjustment.

* * *

The Argentine airline, F.A.M.A., has inaugurated a direct service from Buenos Aires to New York; the first aircraft on this route landed at Idlewild on March 22nd. DC-6s are being used, and elapsed time for the flight is 26½ hr. According to a message from Buenos Aires, the company is about to sell its Avro Yorks and Lancastrians to the Argentine Air Force.

* * *

With a view to expanding the export of South African products by air, the directors of J. W. Kearsley (S.A.), Pty., Ltd., have decided that where air freight charges amount to £25 or more no handling, clearing or incidental charges will be made. The company feels that the only way to popularize air-freighting is to keep handling charges as low as possible, and considers that the new arrangement will not only benefit the import and export agents, but will even enable the selling price of the goods to be reduced.

* * *

The U.S. Civil Aeronautics Board has granted permission for T.C.A. to operate a service between Montreal and Port of Spain, Trinidad, stopping at Tampa and St. Petersburg, Florida. The C.A.B. does not consider that the diversion of business from other U.S. carriers will be very great, taking the view that, in any case, most of the travellers will be Canadian citizens. Protests against the routing of T.C.A.'s Trinidad service had previously been made by several U.S. airlines.

* * *

Because the U.S. Air Force is abandoning its base in the Aleutian Islands, Canadian Pacific Airlines will now have to find an alternative route to the Orient. The Minister of Trans-

CIVIL AVIATION NEWS . . .

port, Mr. Lionel Chevrier, recently told the Canadian Parliament that the United States appeared to be willing to sanction a route via Honolulu. With the establishment of its sales and traffic department at the new Sea Island headquarters, C.P.A. has now completed its move to Vancouver; the majority of the company's staff moved there last summer.

* * *

British Aviation Services (Malta), Ltd., have established a registered Italian branch in Rome to cater for the tourist traffic which is expected during the Holy Year celebrations. The company, which specializes in passenger and traffic handling, states that it already has 26 contracts with both charter and scheduled operators and that under one of these contracts more than 1,000 beds per day have been booked in every class of hotel. Enquiries concerning the arranging of charters and tours should be sent to 12, South Street, Valetta, Malta, G.C.

* * *

When he landed at London Airport on March 21st, Captain L. V. Messenger, of B.O.A.C., was able to claim the distinction of being the first British pilot to complete 300 North Atlantic crossings. He has been flying on this route since 1941, and his air mileage totals almost three million. Capt. Messenger's son is also a Corporation pilot.

FROM THE CLUBS

THE recent annual general meeting of the Royal Aero Club was made the occasion for two important presentations. The R.Ae.C. Silver Medal was presented to Mr. C. L. Pashley, M.B.E., A.F.C., chief flying instructor of the South Coast Flying Club at Shoreham, in recognition of his 40 years' continuous flying, most of which had been on instructional duties. Mr. Pashley's aeronautical career began with gliding in 1908 and, having taught himself to fly in a Bleriot monoplane, he opened his own flying school at Shoreham in 1911. Replying to Mr. Whitney Straight who, as chairman of the R.Ae.C., made the presentation, Mr. Pashley expressed his pleasure at having been associated with such pioneers as Cody and Valentine—both previous recipients of R.Ae.C. Silver Medals—with whom he had flown in the early days.

On the same evening the chairman accepted, on behalf of the club, a portrait (reproduced in *Flight* of March 23rd) of the Hon. C. S. Rolls. It was presented by Captain Eric Smith, chairman of Rolls-Royce, Ltd.

* * *

THIS year's annual rally of the Ultra-Light Aircraft Association is to be held at the Swansea and District Flying Club's airfield at Fairwood Common on the week-end of June 3rd-4th. The Association decided to hold this meeting in the West of England in order to give the many ultra-light enthusiasts in Wales the opportunity of taking part. The rally will include many informal competitions, together with acrobatic and parachuting displays. Saturday's flying activities will be followed in the evening by a dance, and there will be further flying on Sunday before the aircraft return to their bases. Several Continental types are expected to participate. Although, quite naturally, the Association hopes that ultra-light aircraft will predominate, owners of all types will be welcomed. Accommodation is limited, and intending visitors should apply for full details at an early date to the U.L.A.A. Secretary at 24, St. George's Square, Westminster, London, S.W.1.

* * *

WITH only two Taylorcraft and one Magister, the creditable total of 77 hr was logged by Denham Flying Club from March 4th to 21st. This flying included three first solos, and several new members expect to qualify for their pilot's licences this month. Total flying and social membership to date is over 250. To meet the demand for instruction, an Auster Autocrat will shortly be added to the fleet.

The club-house re-opened on March 28th under new management, and now offers members and their guests full catering and bar facilities in what must be one of the most pleasant settings enjoyed by a flying club in this country. The swimming-pool which will shortly become available in the grounds of the club-house will provide a welcome diversion after a hot day's flying. The airfield adjoins the Denham railway station, and is easily accessible to members living in London and the Home Counties. Visitors are always welcome, states the Club, and no landing fees are charged for club and privately owned aircraft.

As an illustration of the value to clubs of forwarding news of their latest developments for inclusion on this page, Denham reports that a recent reference was the means of bringing several enquiries which have lately resulted in additions to the membership.

* * *

A FLYING display and numerous competition events marked the final stages of India's first national air rally, which was organised by the Aero Club of India, and held at Barrackpore on February 25th and 26th. The programme had actually commenced on February 23rd with the 910-mile race from Delhi to Calcutta for the Willingdon Challenge Trophy; this was won by Captain N. V. Namjoshi, of the Government Flying Training Centre, in a Piper Cub. The National Air Race for the Virendra Challenge Trophy over a 541-mile triangular course was flown on the afternoon of the 25th and was followed by the display and competition events.

An aerobatic competition between the instructors of various clubs produced a remarkable exhibition of flying, the first prize again being won by Captain Namjoshi. The Sir Victor Sassoon Challenge Trophy for the best-run club in India was awarded to the Bombay Flying Club.

Vampires of the Indian Air Force provided one of the highlights of the display on both afternoons, and a static exhibition, organized by such companies as K.L.M. and B.O.A.C. in conjunction with many manufacturers, attracted large crowds. The prizes for the many events were distributed on February 26th by Mrs. Roy, wife of Maj.-Gen. S. B. S. Roy, G.O.C. the Bengal Area. The outstanding success of the meeting was evident from the extremely large number of spectators on both days.

* * *

AT Port Elizabeth, South Africa, students are learning to fly at what must be among the lowest rates in the world. The recently revived Port Elizabeth Aero Club sold all its original assets, including a hangar, and used the money thus realised as a subsidy to enable local enthusiasts to obtain tuition at a cost of £1 2s 6d an hour. The club's normal rates were £2 12s 6d.

WORTH WINNING: If the apparent opulence of the trophies is any criterion, the Indian National Air Rally—referred to on this page—must have been quite a lavish spectacle. The meeting was organized by the chairman of the Aero Club of India who is seen (fifth from right) among the competitors.

RECORDS and RULES

Background to a Point-to-Point Flight : How Attempts are Regulated and Controlled

By H. J. COOPER

THE recent record flight by S/L. Neville Duke from London to Cairo in a Hawker Fury called for extensive preliminary work in various offices before he was able to leave. Flights of this sort are not simply a matter of getting into an aircraft when one feels like it and taking-off in an attempt to get somewhere more quickly than anyone else has done. Detailed regulations must be followed before any particular flight can result in a record.

In the first place, the promoter of the flight must notify the Royal Aero Club at least six weeks beforehand that an attempt is to be made on a particular record. Point-to-point Records (or "Speed Records over a Recognized Course," as they are now to be called), are recognized between capitals and certain cities of countries affiliated to the Fédération Aéronautique Internationale and may be made by any type of aircraft regardless of size, number of engines or number of crew.

Three separate kinds of Point-to-Point Records are recognized by the F.A.I.: (i) Outward Record; (ii) Outward-and-return Record, and (iii) Inward Record. As the Fury was being delivered to the Royal Egyptian Air Force, only the Outward Record was attempted by Duke.

As soon as the Royal Aero Club is informed of the proposed flight, it works out the distance between the centres of the two capitals and between the airfield of start and the airfield of finish. The official (Great Circle) distance for Point-to-point Records is from the city centres—in Duke's case, Hyde Park Corner in London and a point which is geographically the middle of Cairo. The aircraft may start and finish at an appointed airfield which is near enough to a particular city justifiably to be called one of its landing-grounds, provided the distance between this airfield and the airfield of finish is not less than the distance between the two city-centres. For example, the official distance between London and Cairo is 1,896.08 nautical miles (3,513.875 km). Duke took off from Blackbushe Aerodrome, near Camberley in Surrey, and landed at Almaza Airport, Cairo, the distance between the two being 1,914.58 nautical miles (3,548.154 km). Had he taken off from, say, Gatwick, the record could not have been established, because from Gatwick to Almaza is less than the officially recognized distance. The figures confirmed as the record are the speed and the theoretical time between the two city-centres. In future, a flight will not be confirmed as a record if made at less than 160 km/hr (99.42 m.p.h.). All instruments used for measuring (time, distance, altitude, etc.) have to be of a type approved by the F.A.I., so that there can be no doubt of their accuracy. The distance is computed by spherical trigonometry, using *Norie's Haversines Tables*, to an accuracy of 1/5,000.

The time of the start is taken when the aircraft *in flight* crosses the starting line marked out on the airfield, and the speed is calculated from then until it crosses the finishing-line marked out on the distant airfield. Landing is permitted on the way, but the record is one for speed, and time spent on the ground counts in the total time. In point of fact, Duke landed at Malta to refuel, but refuelling was effected so quickly that he was off again in just over 15 minutes. Refuelling in the air is permitted, but was obviously not worth while in this case.

If for any reason—such as bad weather—it is not possible for the record-breaking aircraft to land at the intended airfield, it may be diverted to another provided the distance is not less than that of the original course.

Before a new record can be recognized as such it must exceed an existing record by at least one per cent. In the case of the London-Cairo flight, no record had previously been set up, so Duke's record, provided it is confirmed by the F.A.I., will automatically be established. Doubtless there were some fast flights between the two capitals during the war, and by civil airliners since, but none has been officially observed by the Royal Aero Club. [The Comet may alter this at any moment.—ED.]

The Royal Aero Club appoints an official observer and a timekeeper to see that the conditions are correctly adhered to. This has been one of the duties of the Club since it officially observed Louis Blériot's first flight across the Channel in July, 1909. There is a "National Aero Club," corresponding to the Royal Aero Club, in each of the affiliated countries; it represents the F.A.I. and sees that the appropriate regulations are effected. At the start of the flight, the observer must place identification seals on the airframe and engine, and they must not be removed until the aircraft is identified at the aerodrome of finish. Repairs or replacement of parts of the engine and airframe are permitted, but basically the aircraft may not be altered.

When it is airborne, the aircraft has to fly level towards the starting line for at least 1,000 metres at a height of not

(*Continued overleaf*)

WHEN—as explained by the author—all relevant information has been officially analysed, the flights of the D.H. Comet to Rome and Copenhagen will, all being well, qualify for inclusion in the list, given below, of British point-to-point records. The Comet already shown is, of course, the famous Gipsy VI-engined type of an earlier era.

INTERNATIONAL POINT-TO-POINT RECORDS HELD BY BRITAIN

Record and Date	Pilot(s)	Aircraft	Engine(s)	Time h. m.s.	Speed (km/hr)
London—Melbourne 20-23/10/34	C. W. A. Scott; T. Campbell Black	D.H.88 Comet	2 D.H. Gipsy V	71.00.18	255.947
London—Sydney 15-19/1/38	F/O. A.E. Clouston; Victor Ricketts	D.H.88 Comet	2 D.H. Gipsy VI	80.56.00	209.712
Sydney—London 21-26/3/38	"	"	"	130.03.00	130.777
Wellington—London 22-26/3/38	"	"	"	140.12.00	134.306
Cape Town—London 7-9/2/39	Alex Henshaw	Percival Mew Gull	D.H.Gipsy VI-2	39.36.00	243.745
London—Darwin 21-23/8/46	A.Cdre. N. H. d'Aeth; S/L. I. S. Aldridge; F/L. D. D. Hurditch	Avro Lancaster Aries	4 Rolls-Royce Merlin 24-11	45.35.00	305.009
London—Wellington 21-24/8/46	"	"	"	59.50.00	313.270
London—Cape Town 30/4/47 1/5/47	S/L. H. E. Martin; S/L. E. B. Sismore	D.H. Mosquito PR34	2 Rolls-Royce Merlin 114A	21.31.30	449.408
London—Rome 12/5/49	S/L. Neville Duke	Hawker Fury	Bristol Centaurus 18	02.31.51§	577.6
London—Karachi 12/5/49	"	"	"	15.30.27	412.170
London—Paris 13/5/49	S/L. T. S. Wade	Hawker P.1052	Rolls-Royce Nene 2	00.20.37§	944.97
London—Valetta 19/7/49	Lt. Cdr. W. R. MacWhirter; Lt. P. C. S. Chilcot; Lt. D. A. Hook; Lt. D. W. Morgan	Hawker Sea Fury II (four aircraft)	Bristol Centaurus 18	03.20.49	624.260
Gibraltar—London 19/9/49	G/C. A. C. P. Carver	D.H. Hornet F.3	2 Rolls-Royce Merlin 130	02.30.21	701.492

RECORDS AND RULES : : :

more than 100 metres so as to allow direct visual observation by the observer. After getting on to course the pilot may fly at whatever height he chooses, but must cross the finishing line at a maximum height of 100 metres. On landing at Cairo, the seals on the Fury were checked by the observer appointed by the Royal Aero Club of Egypt, and the airframe and engine identified as the originals.

When the flight is over, a dossier of the attempt must be compiled by the Royal Aero Club. This includes a Certificate of Measurement between the two city-centres, and a similar certificate relating to the distance between the starting and finishing lines; Certificates of the Start and Finish, signed by the timekeeper at each end of the course; a log-sheet in respect of the fixing of the official seals; and other papers giving specific details regarding the aircraft, engine and pilot. The completed dossier is then submitted to the F.A.I. in Paris, who check over the figures of speed and distance and, if everything is in order, in due course confirm the record, which is then entered on their official list of International Air Records. If it is found that the figures are in error, and reveal that the speed of the flight is not sufficiently in excess of an existing record, or if there is any doubt about the authenticity of the flight, then the F.A.I. may refuse to confirm the flight as a record. At the time of writing, confirmation of Duke's London-Cairo record is pending.

HAS THE INTERCEPTER HAD ITS DAY? (Continued from page 423)

loading for jet-propelled aircraft. If one allows that the bomb and fuel load of the bomber over the target amounts to one-half of its all-up weight, the fighter's weight still cannot be brought low enough to halve the wing loading. It must carry armament and fuel; it will be lucky if it can get a third of the extra manœuvrability it needs. To help himself, the designer may turn to re-heat or to rocket propulsion. With the former he could either get the same thrust with reduced engine weight, and so reduce wing loading a little, or he could use it to get transonic speeds and hope that the speed will be high enough to restore manœuvrability. The indications are that only the rocket can give enough speed for that purpose.

One solution to the handling problem of jet fighters would be to use armament and tactics which do not require manœuvrability. High values of g mostly arise because the target must be held in the sights at comparatively short range. If the armament could be fired instantaneously at long range the g demand would be quite small. An example of the type of installation is a single-shot gun firing a proximity-fused shell, the sighting and firing probably being automatic, through the medium of a radar set. Unfortunately, all such installations are heavy and bulky, and so handicap the fighter still further as regards performance and handling.

It is ominous that there is talk about rocket-propelled fighters for the defence of this country. Ominous because the rocket-propelled fighter cannot operate without preclusive risk in bad weather or at night; at best it is a clumsy and desperate means of defence. At the cost of flexibility, which is one of the big attractions of fighter defence, rocket propulsion can solve the performance problems of the fighter, and at least ease the handling problem, as the empty weight of the rocket unit is very low. It must be allowed that a combination of rocket fighters, and the best jet fighters that can be produced, would provide some sort of deterrent to the jet bomber in all weathers, and at night. But against well-directed atomic-bomb attacks this could hardly be called defence.

The only real hope of effective defence against jet bombers carrying atomic bombs would seem to lie in the logical development of the rocket-propelled supersonic fighter, namely, the ground-to-air guided missile. Since the air defence of the country has been its special department of warfare, one hopes that the R.A.F. will be entrusted with the job of operating the guided missile.

A "LANCASHIRE" LUNCHEON

SPEAKING at a luncheon given by the Lancashire Aircraft Corporation in London last Friday, March 31st, Mr. Eric Rylands, the chairman, said that the company operated 22 services, served 16 cities, had a maximum daily passenger capacity of 1,570, and between the mainland and the Isle of Man alone could carry 1,326 passengers. He felt that L.A.C., one of the first independent companies to start operations in 1946, had earned a place in civil aviation. He recalled the work done on the Air Lift, on the "Milk Run," and on world-wide charter services, and thought that companies such as his had a right to know what their prospects were for the future a few months ahead of time. Mr. Rylands said that the company were good employers, having paid out some £¾ million in wages. The luncheon inaugurated the third summer programme of services to be operated in conjunction with B.E.A.

On the very important subject of the part that civil aviation could play in the event of an emergency, the chairman said that a mercantile air force could, and should, be formed. He visualized Reserve squadrons which could work for the Air Ministry in a Reserve capacity. All the staff of the Lancashire Aircraft Corporation had indicated their willingness to become members of a Reserve or Auxiliary force, and in times of emergency it was their wish to be available as a complete unit for immediate use. They were well qualified and experienced in their trade, though unfortunately not in any other.

In reply, Mr. Frank Beswick, Parliamentary Secretary to the Ministry of Civil Aviation, congratulated Mr. Rylands on the way he had dug his toes in and made a place for his company, and he wished L.A.C. good luck in the coming year.

The luncheon was attended by a number of senior officers in military as well as civil aviation circles.

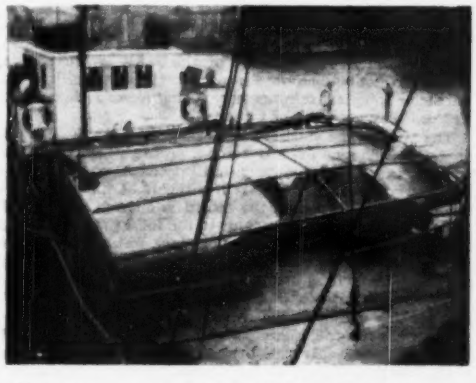
RETIREMENT OF R.Ae.S. SECRETARY

AS we go to press, a statement from the Royal Aeronautical Society announces the forthcoming retirement of Capt. J. Laurence Pritchard, who has been secretary of the Society for the past 25 years. An appeal for funds for a testimonial is being made, and the S.B.A.C. has already promised £500. Further details will be published next week.

TEST-PIECE BY SEA

ON Tuesday of last week, a full-scale replica section of the Saunders-Roe Princess wing was despatched aboard the *Channel Coast*, as deck cargo, for transport to Bristol. The section, measuring 26ft x 31ft x 5ft 9in, was put aboard the steamer at Samuel White's yard, adjacent to the Saro works, and arrived at Cannon's Marsh, Bristol, next day, thence being taken by road to Filton during the week-end.

The purpose of the delivery is to permit the carrying out of full-scale installation test running of the coupled Proteus turboprop units with which, of course, the Princess is to be powered. A similar policy was proven to be highly successful in the case of the double Centaurus power installation for the prototype Brabazon.



The wing section, with protective cradle, on the ship's deck.

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CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Those Saucers

I HAVE noticed with some interest that the "flying saucer" question has achieved considerable prominence once again, and I was both interested and amused to read the paragraph entitled "Pint-sized Pilot Pickled" in your issue of March 16th.

With very few exceptions, I take a very dim view of reports on most aeronautical matters as seen in the majority of our daily papers, but there are so many reports of these "soucoupes volantes" (as the French have it) which do sound reasonably feasible that I think there must be something behind it all.

Of all the thousands of "types" who are supposed to have viewed these wonders of the ether with astonishment, surely some competent being of the aeronautical world must have seen some of them, if there is any truth in the subject at all? I have not yet read or heard of any official or really authoritative article on the subject.

Very wisely, I think, *Flight* has not voiced any definite opinion on this question.

May I conclude by saying I consider your magazine to be far and away better than *any* other comparable journal in the same class, and humbly wish you and your editorial staff the very best of luck with your publication always? I know I could not do without it!

FRANCIS V. POUND.

Harrow Weald, Middlesex.

ONE is a little shaken to find the worthy Mr. Charles Gardner, of all people, warning us ("Crockery Corner," *Flight* Correspondence, March 30th) of impending doom at the hands of saucer-borne, pint-size Martians. Does he not recall what happened a few years ago in the United States when an equally illustrious radio commentator issued a similar warning? I do not suggest, of course, that *Flight* readers would rush in hordes to jump off the British equivalent of the Brooklyn Bridge, or whatever it was that the more trepid of the American listeners did when listening to a "Martian invasion" play.

My own view is that the danger is overrated. Just think. The very first little man to touch down would find himself surrounded by a horde of M.C.A., Customs and Immigration officials demanding his I.C.A.O.-approved pilot's licence, general declaration, passenger manifest, disembarkation card, cargo manifest, baggage manifest, international certificate of inoculation, passport, visa, and sworn oath that he was carrying neither nylon stockings nor uncooked meat.

He would be back in his saucer, pressing all the atomic-assisted take-off buttons at once, and radio-ing "Scrub the op, chaps," before you could say Pakenham.

London, W.1. FEARLESS FREDDIE.

Reserve Recruitment

I HAVE noticed recently the publication of several letters by ex-Service personnel regarding the almost prohibitive conditions required for entry of pilots into the R.A.F. Reserve Forces. I agree with these correspondents that the qualifications required practically prohibit the entry of partially trained aircrew into the Reserves unless they qualify privately at great expense. But what of the poor young fellow who for obvious reasons has decided, after leaving school at the age of 16 or 17, to undertake a course of further education in higher technology or in one of the many branches of engineering and has consequently been deferred from National Service until he has completed his technical training? As in my own case, for example—that of an aeronautical student at one of the several technical colleges now teaching this branch of engineering.

I and many of my fellow students taking a broader outlook on aviation decided initially to educate ourselves both technically and practically, including practical flying training. But can we do all these things? Definitely not, if the cost of flying remains at its present exhorbitant level. I myself was extremely lucky in winning one of the few Air League flying scholarships last year and by means of which I obtained my Private Pilots' Licence. But where am I now? Almost back where I started. I have made repeated attempts to join the R.A.F. Reserves but of course I am not sufficiently qualified. What, then, am I to do? This question must surely be worrying the organizers of the recently announced flying-scholarship scheme, for if the State is to provide means for young fellows like myself to obtain flying training, surely their support will abide with the young State-sponsored fledglings until their qualifications meet with the requirements of the R.A.F.V.R.; or, alternatively, the R.A.F.V.R. might reduce its present standard of qualification to a level which permitted the scholarship trainees to continue their training under R.A.F.V.R. supervision.

Perhaps I may summarize the points outlined above as follows. An air-minded fellow on leaving school decides that, in spite of the temptation immediately to enter the R.A.F. as aircrew under a short-service agreement, he might undergo further education in aeronautical engineering with a hope of obtaining flying training. If he proved worthy, then would the State air-scholarship scheme provide the necessary means, in conjunction with the R.A.F.V.R., to give him a good, sound training and maintain the standard he would attain? If this were so, he would, at the end of his technical training, enter the R.A.F. either for short- or long-term service. If he chose a short period of National Service, on leaving the R.A.F. he would be in a position to give valuable service to the aircraft industry.

This system, I have no doubt, would produce both military and civilian personnel capable of undertaking technical posts or flying duties or both, with the necessary education and grounding that is required in modern aviation.

Bridlington, Yorks. R. C. L. SAMPLE.

Which Way Up?

WITH regard to the photographs which I recently secured of a Meteor Mk 8 looping in formation with a Mk 7 (and which were published in *Flight* of March 9th), your correspondent, Mr. Will Lynch, A.R.P.S., has, as you suggest, raised a matter which has always been very debatable, particularly among photographers.

It is generally accepted by many that a photograph should appear in the position in which the photographer saw the subject when making the exposure, in which case the suggestion put forward by Mr. Lynch would be in order, although I would not venture to say in this case that the vivid impression would be increased. I thank him for taking such an interest in the photographs but I would hasten to say that if they had appeared as he suggests I would have been rather disappointed; in fact, I take this opportunity of paying tribute to *Flight* for the very excellent set-up and reproduction.

Whilst I do not intend to dogmatize, it is my opinion that air-to-air photographs should be printed, where possible, with the sky-line level. This serves to indicate immediately the attitude of the aircraft in the photograph, a point which is readily appreciated by "flying types" especially. I feel that the whole thing depends on what the picture is intended to depict. In this instance I wanted a picture of a Mk. 8 executing a loop, something a bit different from the usual line of air-to-air shots. The fact that I was being looped in formation in a Mk. 7 was, to me at least, of secondary importance; it seemed the only practicable way of going about the job, although of course the conditions thereby introduced were not exactly ideal for handling a large camera! Skilful handling of the aircraft by the pilots, however, helped keep the *g* at a reasonable figure.

The resulting pictures, regarded purely as impressions of a Mk. 8, have a certain amount of pictorial value too, and can be used quite easily without explanatory captions: The first

One of the two pictures under discussion. Left: as it was. Right: as it might have been.

CORRESPONDENCE . . .

of a Mk. 8 diving earthwards, the second of one inverted, presumably at the top of a loop. If an artist was asked to paint such impressions I am confident he would produce them the same way-up as those reproduced in *Flight*. Any prints which may eventually find their way into frames will probably not have captions telling how and why, and I feel, therefore, they will always be seen in the same position as they made their debut in *Flight*.

On this same flight I also photographed the Mk. 8 in close formation with us, climbing at a sustained angle of 35 deg. To have printed the resulting picture with the aircraft level (as I saw it) and the horizon set at 35 deg would have given no impression of climbing at all! So you see, Mr. Lynch, although as a photographer I appreciate your remarks, I think you will agree it depends largely on what one is trying to convey when producing air-to-air photographs; the position of the aircraft relative to the horizon helps considerably towards "telling the story" and, therefore, it seems quite reasonable for the horizon to be indicated, as nearly as possible, in its normal position. RUSSELL ADAMS, Research Dept.,

Hucclecote, Glos. Gloster Aircraft Co., Ltd.

I CANNOT agree with Mr. Will Lynch in his criticism of what are perhaps the finest air-to-air photographs that I have seen for a long time in *Flight*.

Having done some flying myself and not quite, though very nearly, being a "landlubber" I can only say that I was extremely impressed by the past-vertical attitude of the Meteor 8. In this position, the impression is vividly and startlingly given of all the drama attending a vertical dive. Mr. Lynch's suggested position reduces the photograph to that of a Meteor flying straight and level, with the horizon displaced; and, again, if we turn upside down the picture of the Meteor flying inverted, we get precisely the same result.

If we constantly follow Mr. Lynch's suggestion, we should get nothing but an interminable array of aircraft in straight and level flight, with horizons draped, sometimes, at unconventional angles, but I personally prefer photographs like those secured by Mr. Adams in the position in which they were rightly put.

Wilmslow, Cheshire. G. P. GASS.

Memories of the Sidestrand

WHEN ease of maintenance is discussed, mention is seldom made of the aircraft which, in my experience, was the most easily maintained of any produced during the last twenty years—the Boulton-Paul Sidestrand. Mention by Mr. R. E. Bishop in his paper (quoted in *Flight* for March 9th) of hinged instrument panels, etc., recalls that the Sidestrand solved this problem in an even more satisfactory manner by hinging the whole of the front-gunner's cockpit so that the instrument panel could be tackled from the back without disturbing the panel itself. This had the advantage that all leads and pipes remained *in situ*, with no danger of fouling them, and work could be done at the rear of the instruments with ease. The same aircraft embodied engine gates, secured by two taper bolts, which permitted swinging the engine out and made the fitter's job on all the gadgetry behind the engine so much easier and less blasphemous. When it is remembered that this was the age of engines backing up to within about six inches of fixed and solid fireproof bulkheads, the boon to the fitter can be imagined.

Admittedly, engine gates could not be used (nor are they necessary) for jet installations, and might not now be practicable with other engine types, and instruments have multiplied and may now be housed in pressurized cabins; but it is surely the principle behind these innovations (in that day), which is important. By and large, Boulton-Paul were in advance of other manufacturers in the provisions for ease of maintenance—in some cases, 20 years in advance. Performance was not sacrificed to give this, either, for the Sidestrand, although a bomber, was faster than some of the fighters in service at that time, and, even against faster fighters, the then phenomenal fire-power of front gun, upper rear gun, and downward-firing rear gun made a close formation virtually invulnerable—at least, with camera guns. In its bombing role, the Squadron which used it won the annual Sassoon Trophy almost as a matter of course.

Many will remember the aerobatic displays of the Sidestrand against fighter attack at the old Hendon pageants; however, although the Sidestrand did these stunts, I do not claim that this represented one of its roles, but I do know that the fuselage arrangements were such that the cross-bracing wires slackened by the aerobatics during each performance could be adjusted readily from within the fuselage without undue contortion even on my part. Then, as now, I was over six feet tall and proportionately stalwart.

Although the Sidestrand was subject to the usual R.A.F. periodic inspections, the airframe actually went 120 hours without *need* for attention, with two exceptions. One was the replacement of snapped flying wires, the Sidestrand's side really bad habit. This might happen at any altitude, but was most prevalent near the ceiling (about 19,000 feet!), and pilots became mildly worried only when two flying wires on the same side were broken. The other minor snag was in the oleo legs, which, for some peculiar reason best known to the designer, carried the oil chamber above the air chamber, with a diaphragm between, with the result that leaking legs were not uncommon, although the result was not serious.

The graceful fuselage lines of the Sidestrand were destroyed in its successor, the Overstrand, by the fitting of the first power-driven gun-turret in the nose—and I had the doubtful honour of receiving the first aircraft so fitted. I can still remember that my life was soured by the fact that I had to service and operate this turret by trial and error (much error), ithout benefit of instructions or drawings, and the turret was not, to say the least, without the teething troubles which might be expected. Perhaps this clouded my judgment, but I never had the feeling for the Overstrand which I had for its predecessor, even though the oleo legs had been reversed to place the air chamber over the oil chamber. In another direction, that of aerobatics, the Overstrand was not as satisfactory, especially in looping. The fact that she lost some 1,000 feet in a loop was discovered by Sgt. Pilot Reddick (now, I believe, Wing Commander), who began his first loop at an altitude of some 1,050ft, and spent the next few moments with the stick irremovably in his belly, praying for the aircraft to come out of the loop. The odd fifty feet saved him, and a very demoralized corporal in the front turret. H. R. BUNN, M.B.E., A.R.Ae.S.,

Isleworth, Middlesex. Squadron Leader.

Elephantasy

I READ with some despondency in your March 23rd issue that B.O.A.C. had refused to transport two elephants. Bearing in mind the uneven distribution of the world's elephant population it seemed a niggardly action. One form of transport should augment, not retard another.

It is this attitude that, in my opinion, will bring disrepute upon our airlines.

Transporting elephants by air is quite a simple operation. First, charter a torpedo-carrier aircraft. Then fit harness on the barrel of the animal and clip the harness to the torpedo racks. The elephant is now in a state of suspension.

Two men must accompany the beast, his mahout to reassure him and a Corporation employee to reassure the mahout. A warm suit of pyjamas and special goggles should be fitted on the animal, plus four roller-skates to ensure a safe landing if he stretches his legs.

Concerning your suggestion that apprehension about the transportation of elephants by air had been engendered by the behaviour of one of them on the British railway system, I put it to you, Sir—what would you do to the present British Railway system if you were an elephant?

Middlesbrough, Yorks. THE MISSIONARY.

FORTHCOMING EVENTS

April	7.	R.Ae.S. (Portsmouth): "Aircraft in Future Warfare," by Air Marshal Sir Robert Saundby, K.B.E., C.B., M.C., D.F.C., A.F.C.
April	8	British Interplanetary Society (Manchester): Film Show.
April	12.	R.Ae.S. (Reading): "Flying Boats," by H. Knowler, F.R.Ae.S.
April	13.	R.Ae.S.: "The Berlin Air Lift," by A. Cdre. J. W. F. Merer, C.B.
April	13.	Guild of Air Pilots and Air Navigators: Annual General Meeting.
April	18.	Aero Golfing Society: Instone Cup Meeting.
April	19.	Institute of Transport: Informal Luncheon. Speaker: Sir Miles Thomas, D.F.C.
April	18.	R.Ae.S. Graduates: "Training of Aeronautical Engineers." (Discussion; chairman, Marcus Langley, F.R.Ae.S.)
April	21.	Institute of Navigation: "Dynamics of Space Flight," by A. C. Clarke; "Interplanetary Navigation," by Dr. R. d'E. Atkinson.
April	25.	R.Ae.S. Section Lecture: "Flight Refuelling and the Problem of Range," by C. H. Latimer Needham, M.Sc., F.R.Ae.S.
April	25.	R.Ae.C.: Film Show, Londonderry House.
April	26.	R.Ae.S. (Prestcon): Annual General Meeting.
April	27.	R.Ae.S.: "High-speed Research in the Aerodynamics Division of the N.P.L.," by J. A. Beavan, M.A. (Cantab.), A.F.R.Ae.S. and D. W. Holder, D.I.C., A.C.G.I., B.Sc. (at Manchester).
May	4.	R.Ae.S.: Third Louis Blériot Lecture, by Sir Frederick Handley Page, C.B.E., F.I.Ae.S., Hon. F.R.Ae.S. (in Paris).
May	14.	R.Ae.S. Garden Party, White Waltham.
May	16.	Aero Golfing Society: Flight Cup Meeting, St. George's Hill.
May	19.	Bomber Command Night, Royal Albert Hall.
May	20.	Northamptonshire Aero Club: At Home.
May	25.	R.Ae.S.: 38th Wilbur Wright Memorial Lecture, by Sir Richard Fairey, M.B.E.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

STRIKE FIGHTER: A spirited study of the Westland Wyvern T.F.2 (Armstrong Siddeley Python turboprop) now in production for Naval Aviation as a successor to the Firebrand. A two-seat trainer version, now on test, is designated Wyvern T.3.

Ark Royal Launch

IT is hoped that some 400 officers and men from the old *Ark Royal*, sunk off Gibraltar in November, 1941, will see the Queen launch the new 36,800-ton carrier of that name at Cammell Laird's Birkenhead yard on May 3rd. A sister ship, H.M.S. *Eagle*, is now nearing completion at Harland and Wolff's Belfast yard. These two carriers will be Britain's largest.

Helicopter Ambulances

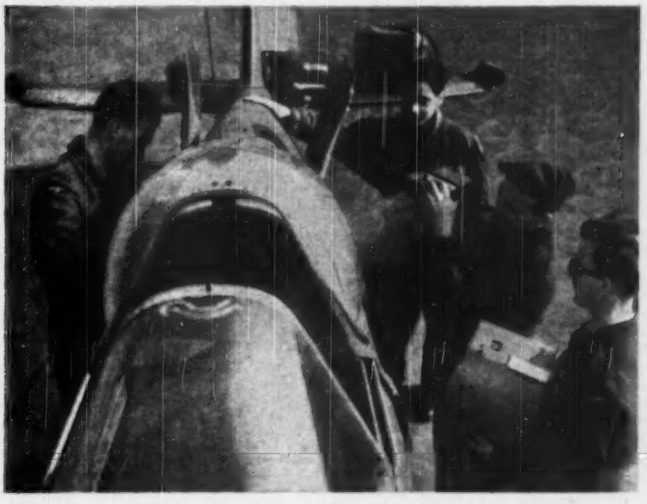
THREE Westland-Sikorsky S-51 ambulance helicopters will arrive at Singapore by sea about the middle of this month. They will be used to evacuate casualties sustained by jungle patrols operating against the bandits, and will be based at Kuala Lumpur and Butterworth.

Biggest Australian Survey

USING de Havilland Mosquitoes, the Royal Australian Air Force is to undertake an air survey of a million square miles of Northern Australia. The operation will be the biggest upon which the Service has yet embarked, and has been requested by the Federal Government partly for defence purposes and partly to assist in the development of the area.

Esher Trophy Presentation

AT noon on Wednesday, June 21st, in the quadrangle of Buckingham Palace, His Majesty the King will present the Esher Trophy to No. 604 (County of Middlesex) Squadron, Royal Auxiliary Air Force. This will be the first occasion that the trophy has been awarded since before the war. It was presented in 1926 by the late Lord Esher for the most efficient Auxiliary squadron and was won by the County of Middlesex Squadron in 1934, 1936 and 1937.



CAMERA STUDY: Installing a reconnaissance camera in a Spitfire P.R.Mk.19 (Rolls-Royce Griffon 66 engine) of a B.A.F.O. squadron. Having a longer range than comparable jet-propelled machines, the Spitfire remains standard equipment in reconnaissance units of the R.A.F. Replacement, however, cannot be long delayed.

Hockey Draw

THE first match of the Services hockey championship at Uxbridge on March 29th, between the R.A.F. and the Royal Navy, resulted in a 2:2 draw. The failure of either side to establish a definite advantage may have been partially attributable to an injury to W. S. Green, the R.A.F. Irish international inside left, who retired temporarily.

Visitor from Pakistan

THERE was a reception at Pakistan House on the night of March 29th, in honour of A.V-M. R. L. R. Atcherley, Commander-in-Chief, Royal Pakistan Air Force, who is home on a visit. The guests included the C.-in-C.'s twin brother, A.V-M. D. F. W. Atcherley.

Popular Training Move

UNDER a new scheme initiated by Reserve Command with the operational commands of the R.A.F., members of the R.A.F. Reserve (including the R.A.F.V.R.) may now have the opportunity to fly alongside their counterparts of the regular aircrews, not only on Bomber and Coastal Command training flights to such targets as Heligoland, but also to Singapore and Nairobi with Transport Command.

These flights, together with lectures at operational stations of the R.A.F., will provide the reservists with the fifteen days' continuous training which forms part of their annual liability during their reserve service and which entitles flying personnel of the R.A.F.V.R. to their tax-free bounty of £30 or £35.

Some 4,500 pilots, navigators and signallers of the R.A.F.V.R. are eligible to volunteer for these training facilities, which are intended to refresh aircrew in the handling of operational aircraft.

Lincolns Strike

IN co-operation with the security forces, aircraft of the R.A.F., including Avro Lincoln bombers, struck on March 27th at an extensive area in the Bahau district of Negri Sembilan, known to be sheltering a large concentration of bandits. A number of pin-point targets were accurately attacked by waves of

SERVICE AVIATION . . .

aircraft with bombs and rocket projectiles. The surrounding jungle area was strafed with machine-gun fire in an attack of thirty minutes' duration. Very low cloud was experienced in the target area but in no way upset the accuracy of the strike.

Reserves Club Occasion

AIR CHIEF MARSHAL SIR GUY GARROD, G.B.E., K.C.B., M.C., D.F.C., president of the R.A.F. Reserves Club, with members of the committee, extended a warm greeting to three new vice-presidents on March 28th, the occasion being an informal cocktail party at the comfortable premises which the club at present shares with the R.N.V.R. Club, at 38, Hill Street, London, W.1.

The new "V.P.s," who are as well liked as they are well known in the Regular and Reserve Services, are Air Marshal Sir Richard Peck, K.C.B., C.B., O.B.E., Brigadier General A. C. Critchley, C.M.G., C.B.E., D.S.O., and Sir Archibald McIndoe, K.B.E., M.S., M.Sc., F.R.C.S., F.A.C.S. Sir Archibald's association with the club is an especially happy one, for to his personal skill in plastic surgery so many maimed aircrew owe more than can ever be repaid. His interest in the club's activities—and, for that matter, in all things aeronautical—was immediately apparent in conversation at the party.

Teachers' Briefing

AT the R.A.F. College, Cranwell, this month, some 50 masters from British public schools will assemble for a four-day course of instruction on the workings of the modern Air Force. The "pupils" are all commanding officers of R.A.F. sections in the Combined Cadet Force.

On April 11th they will meet at Cranwell for an address by Air Marshal R. M. Foster, A.O.C.-in-C., Reserve Command. The teachers' crowded four-day programme includes visits to a Fighter Command station, the Radio Apprentices' Wing at Cranwell, and the School of Land-Air Warfare at Old Sarum, to which they will be taken by air. They will also fly to the Transport Command base at Lyneham, the R.A.F. Flying College at Manby, and the bomber station at Waddington.

ROYAL VIKING: Seen leaving London Airport for Malta on March 28th, is a King's Flight Viking, bearing Princess Elizabeth to join her husband, the Duke of Edinburgh, who is a first lieutenant serving in the destroyer H.M.S. *Chequers*.

Air Meteorological Observers

THE wartime aircrew category of Air Meteorological Observer has been revived by the R.A.F. The limited number required will, at present, be recruited only from scientific assistants in the Met. Office who have registered for, or recently begun, their National Service.

Volunteers will be given two months' training at Aldergrove, Northern Ireland, after their recruit training, in order to qualify for their flying badge. On qualification they will be promoted to the rank of Air Meteorological Observer IV. During training pay will be 4s a day in the first six months of whole-time National Service, and 5s a day afterwards or at any higher rate of pay already applicable in the case of those qualified for it. Trainees will also get flying instructional pay at 2s a day on beginning their flying training.

On promotion to Air Meteorological Observer IV they will receive 9s a day until the end of the first year of their National Service; afterwards they will receive 10s a day. The flying badge is a wing with the letter "M" inscribed within the laurel wreath.

ULSTER TROPHY: The Secretary of State for Air, Mr. Arthur Henderson, is seen presenting the Cooper Trophy to F/O. W. H. Bowden, a pilot of No. 502 (Ulster) Squadron, R.Aux.A.F. F/O. Bowden won the inter-squadron event at the National Air Races last July. Air Marshal Sir Basil Embry, Air Officer Commanding-in-Chief, Fighter Command, is in the centre

A.D.C.s to the King

THE appointments are announced of two new Aides-de-Camp to the King, G/C. R. C. Mead, C.B.E., D.F.C., A.F.C., and G/C. L. C. M. Brown, O.B.E., M.A. The former succeeds G/C. D. H. F. Barnett, C.B.E., D.F.C., who has been promoted to the substantive rank of Air Commodore, and G/C. Brown succeeds G/C. D. E. Williams, M.B.E., M.A., who has retired from the Service.

R.A.F. Awards

THE King has been graciously pleased to approve the following awards:—

George Medal

S/L. R. E. Woolley, M.R.C.S., L.R.C.P., R.A.F. Maintenance Base (Far East) Seletar, displayed great bravery, determination and skill following a take-off accident to a Sunderland at Seletar last November. The aircraft, which crashed in shallow water, was loaded with over 2,000 gallons of fuel, which spread over the surface. Despite the grave danger of fire from damaged circuits, and lightning—a violent thunderstorm was raging—S/L. Woolley immediately extricated two trapped, badly injured members of the crew; to extricate the pilot it was necessary to undertake, in very difficult and dangerous conditions, the amputation of his trapped leg. S/L. Woolley succeeded in freeing the pilot, who, however, died the following day.

British Empire Medal

Navigator 1 S. P. Cawthorne, No. 201 Advanced Flying School, Swinderby, took prompt and gallant action when a Wellington caught fire after an emergency landing at Tangmere last December.

King's Commendations

In connection with the award to S/L. Woolley, the following also have been commended for brave conduct: F/L. W. B. Kennedy, M.B., Ch.B., L.A/C. D. W. DeMynn, L.A/C. R. S. Smith, A/C. 1 W. J. Probert.

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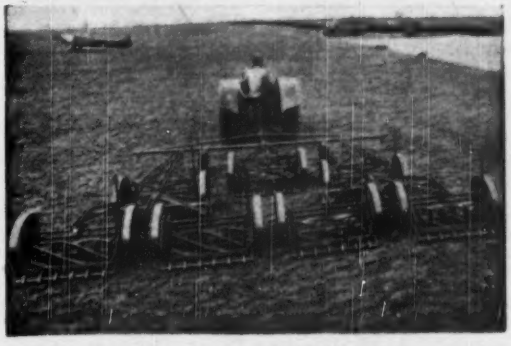

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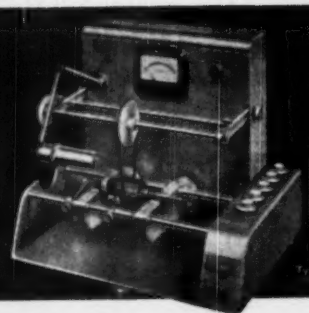

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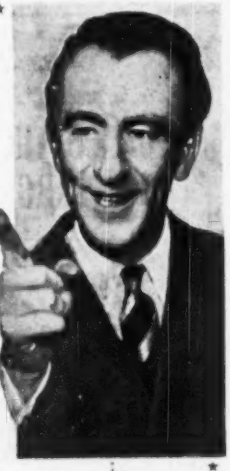

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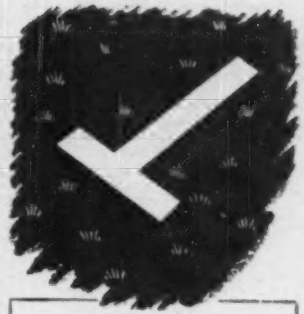

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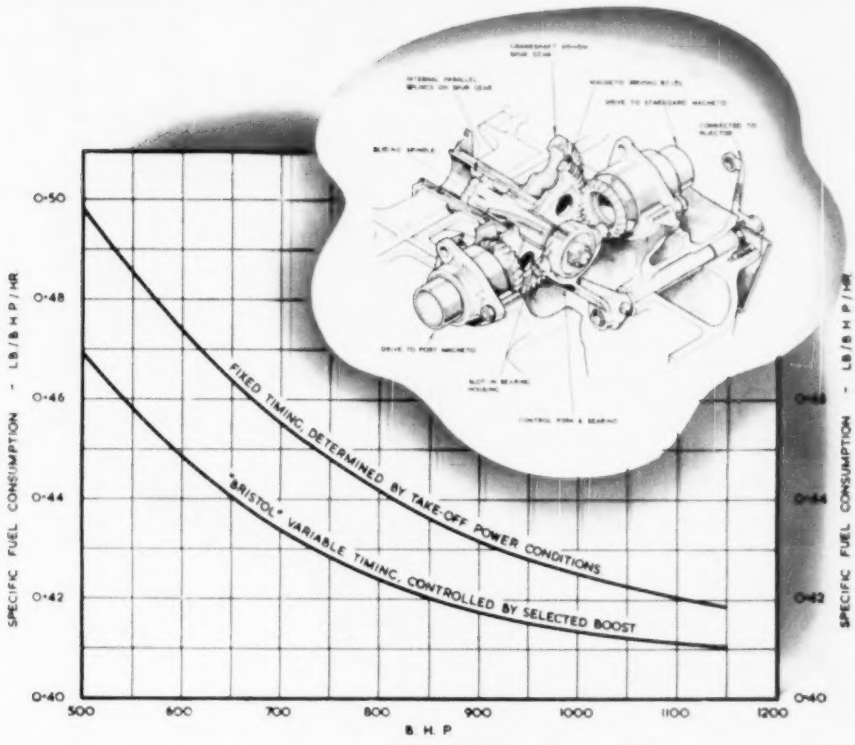

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